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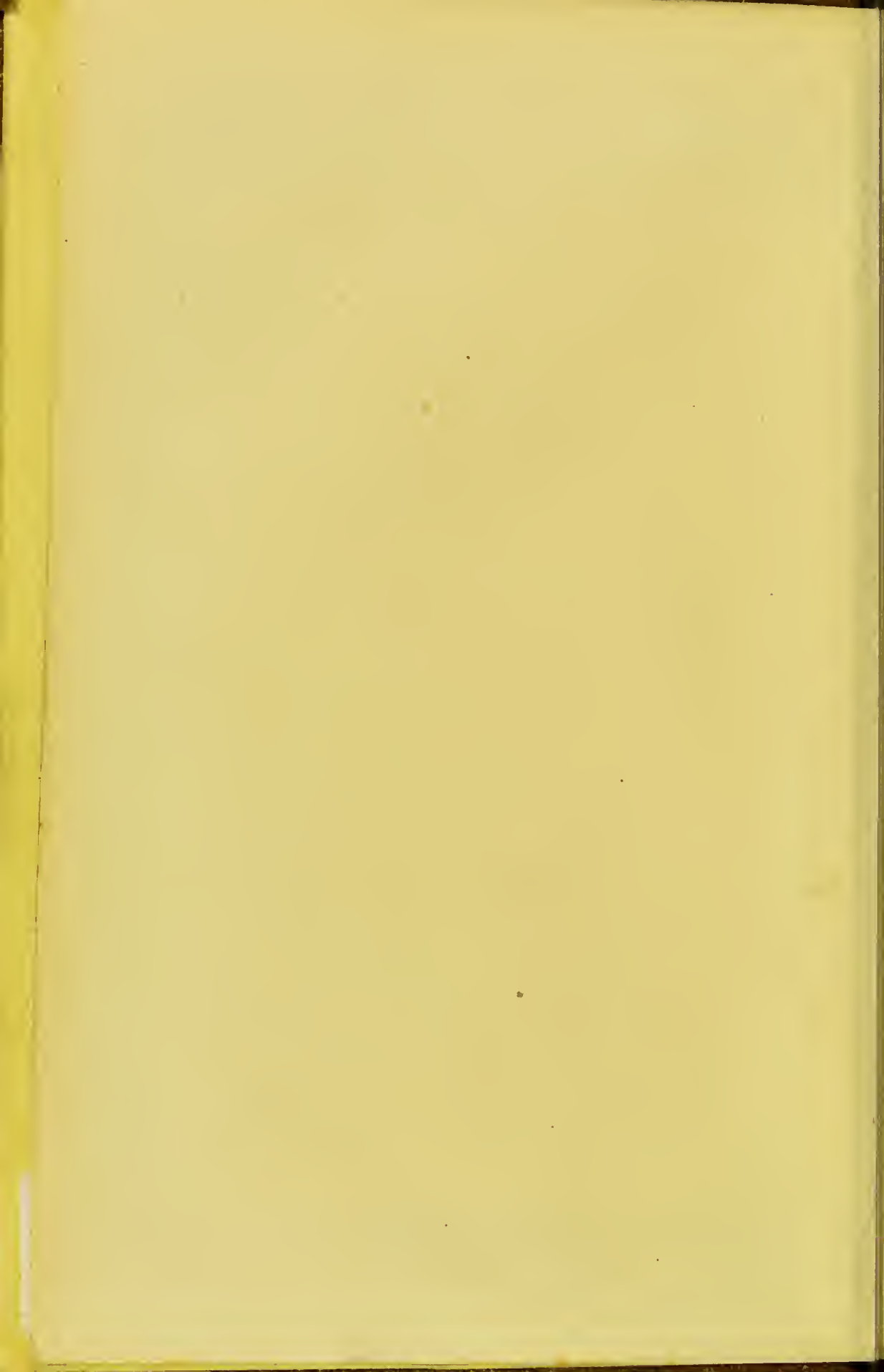
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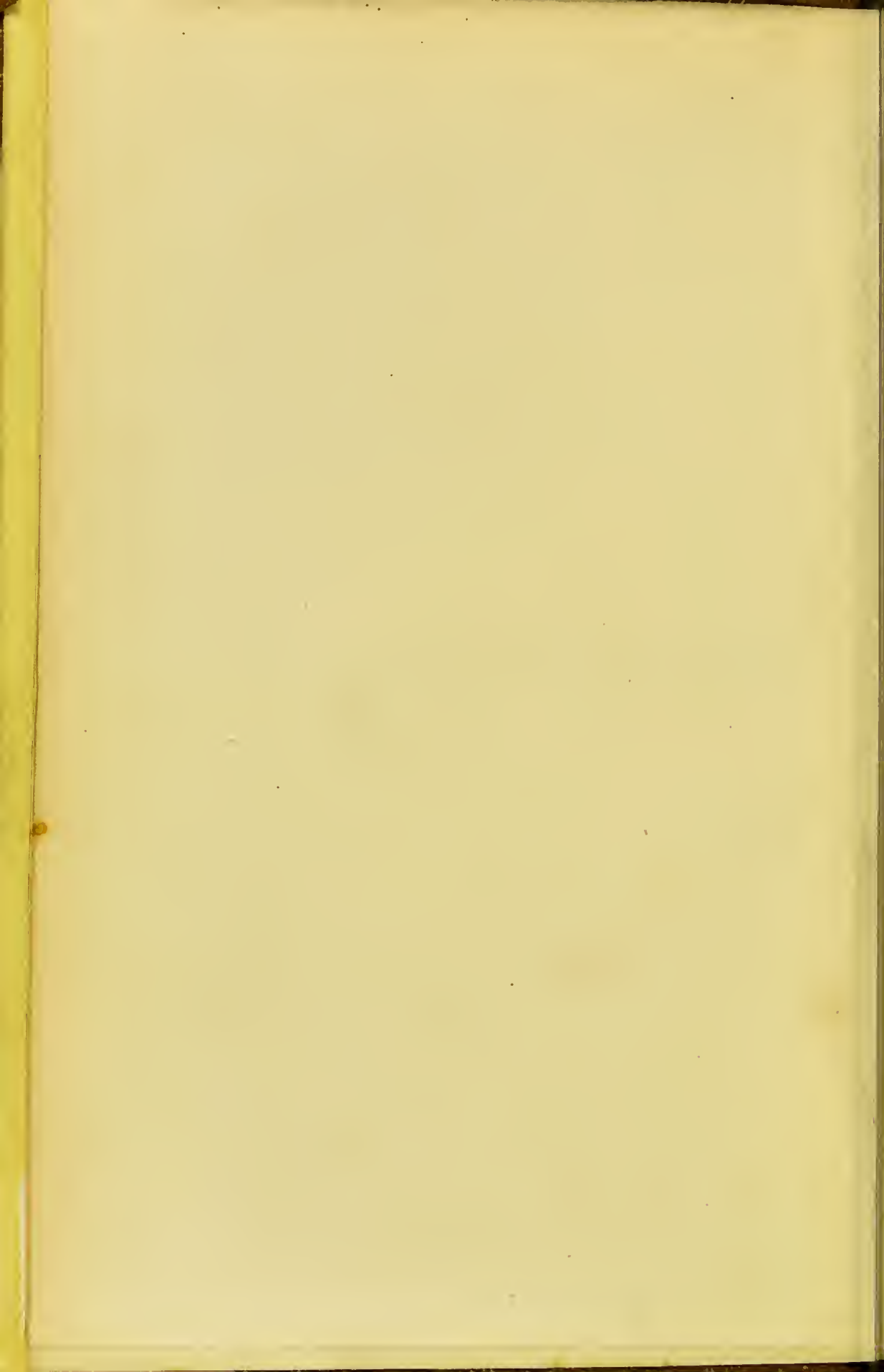
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CHOLERA IN ITS HOME.



CHOLERA IN ITS HOME.

WITH A SKETCH

OF THE

PATHOLOGY AND TREATMENT OF THE DISEASE.

"Nam penitus veniens *Ægypti* finibus ortus,
* * * * *
Fit quoque, ut in nostrum cum venit denique cœlum,
Corrumpat, reddatque sui simile atque alienum."

LUCRET.

BY

JOHN MACPHERSON, M.D.,

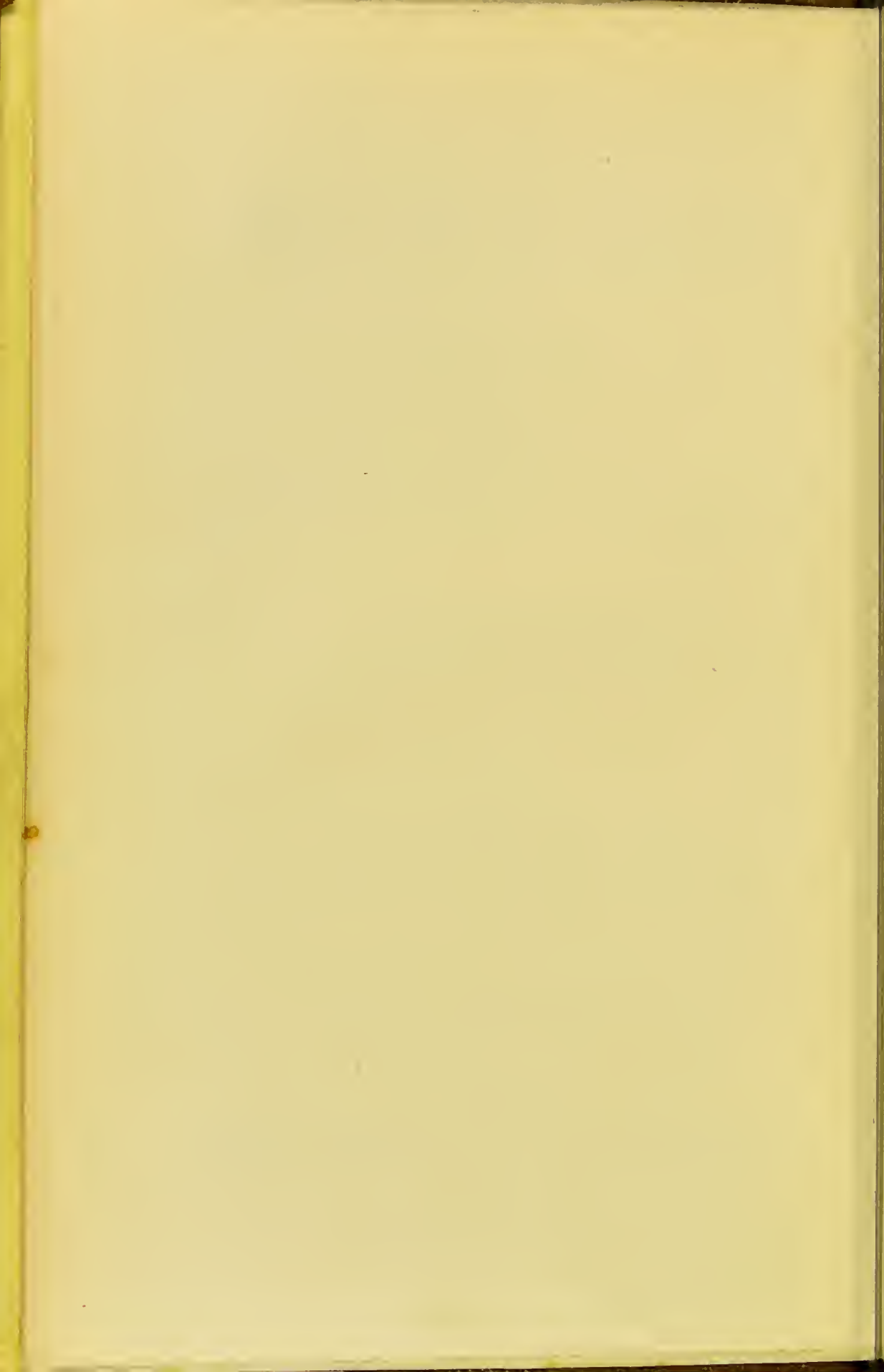
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P R E F A C E.

THE following pages are not intended to give a complete account of Cholera; still it is hoped that they glance at all points of essential importance in its theory or treatment. The first portion of the book is special, and only considers the etiology of the disease, as it occurs in that part of India where it has been fixed for the longest period.

The other two portions are of a general nature: indeed, it has been my endeavour, avoiding any exclusive view, to take as extended a survey of the subject, as was practicable within the limits which I had assigned to myself.

A lengthened experience of the disease has enabled me to observe the rise as well as the fall of many theories and methods of treatment, and may give me some title to regard the whole subject from a practical point of view.

One main object of these pages is, to show what medicine can, and what it cannot effect, in Cholera: and their end will have been answered if they tend

in any degree to check the unreasoning adoption of every possible remedy (most of them being in reality old ones resuscitated) which was displayed when Cholera lately threatened us, and which it is to be feared will again manifest itself, should Cholera visit us during the course of the approaching summer or autumn.

35, CURZON STREET, MAY FAIR,
April 23rd, 1866.

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ERRATA.

Page 5, line 4, for "three and one-third," *read* "two and a half."

„ 41, note, for "cyclone," *read* "cyclome."

„ 51, line 4, after "treated," *insert* "by the natives."

„ 51, note, for "*daka*," *read* "*dakée*."

„ 64, line 20, for "in the latter," *read* "in this last."

„ 67, line 11, for "suddenly," *read* "gradually."

„ 76, line 4, for "of that fluid," *read* "the blood."

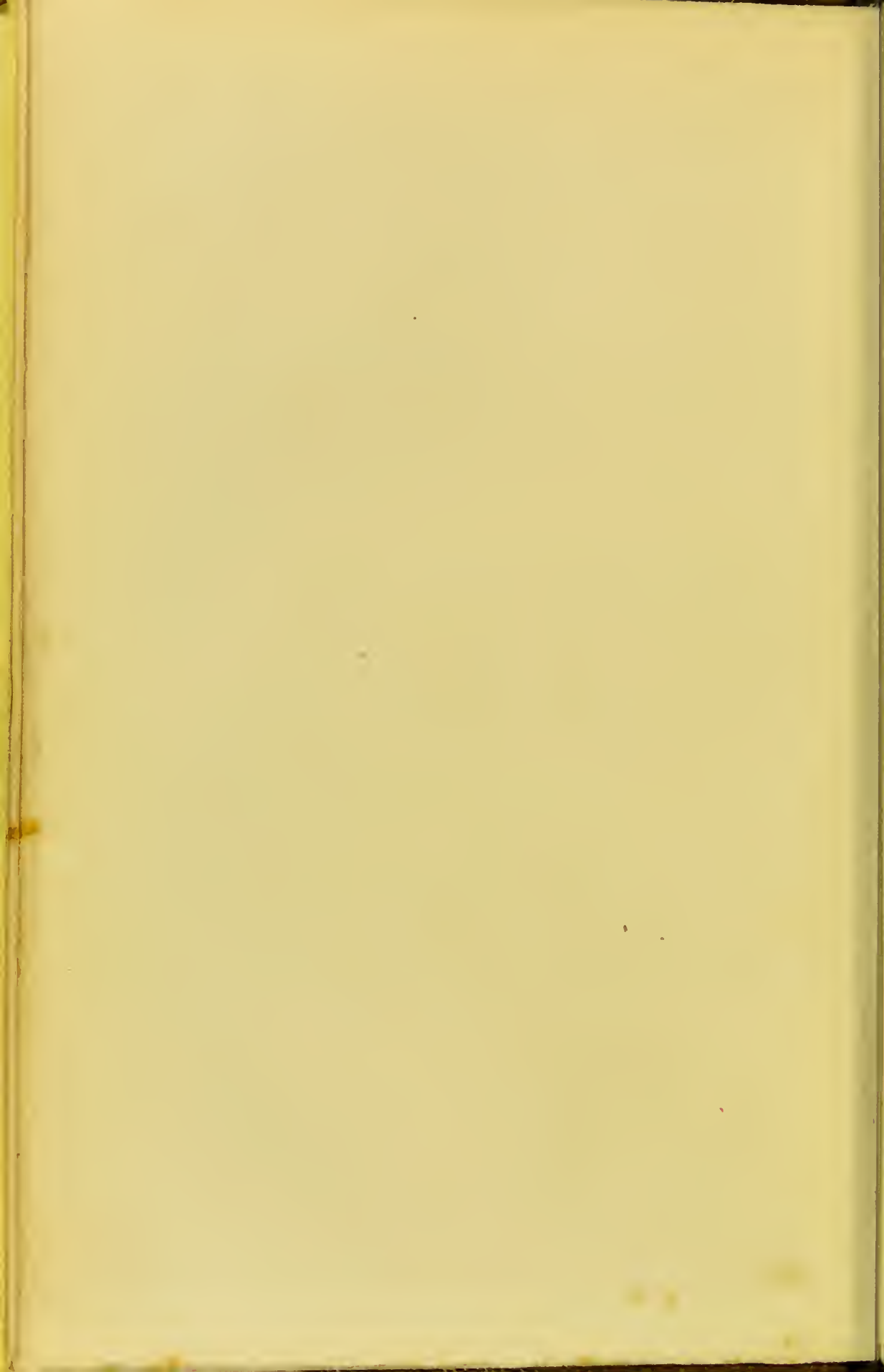
„ 77, line 23, for "seem to," *read* "soon."



CHOLERA IN ITS HOME.



ETIOLOGY.



CHAPTER I.

APPRECIABLE ATMOSPHERIC CAUSES.

*Aut extrinsecus ut nubes nubilæque superne
Per cælum veniunt.*—LUCRET.

IN the midst of the conflicting statements that we have in such abundance respecting the propagation and diffusion of cholera, it is satisfactory to have a few facts before us which are not open to dispute. They refer to the disease in the country in which, whatever it may have been before that period, it has been endemic since 1817. Sufficient facts have accumulated to enable us to see more of some of the conditions under which the disease appears in its original home than in any other country. Whether they admit of any general, as they certainly do of partial, application, it is at least something to know that cholera has distinct and definite laws in one portion of the world, and one too of particular interest to us as the source of the disease.

Cholera in the East seems to have been first described in modern times by García del Huerto,* a physician at Goa, about 1560. He knew it by two native names, one still the common term for it, *mordxe* and *hāizā*. It appeared chiefly in June and

* Coloquios dos Simples. Doctor García Dorta. Goa, 1563.

July, killing people in twenty-four hours, sometimes in ten, and at longest in four days. He also gives the native treatment of it.

Although it is impossible to doubt, after reading his description of it, that Bontius* also saw sporadic cases of malignant cholera in Java before 1629, and though the evidence is, I think, quite convincing that epidemics of malignant cholera have been noticed in India, certainly since 1774, and that in 1781, when there was an outbreak in Ganjam, the disease travelled to Calcutta, and from that place northwards, yet cholera undoubtedly first took root in Lower Bengal in 1817, not however commencing in the district of Jessore specially.

Climate.—It may be well to say that Jessore, in which district cholera is usually considered to have made its first appearance, is in the delta of the Ganges, about eighty miles from Calcutta, and having in all essentials the same climate as that place—indeed, the climate and the alluvial soil of Lower Bengal are wonderfully uniform. To make what follows more intelligible, I must premise that the natural division of the year in Calcutta is into three seasons of four months: the hot and dry, half February, March, April, May, half June; hot and wet, half June, July, August, September, half October; and cold and dry months, half October, November, December, January, half February. These half-months, unfortunately, are not represented in nu-

* De Medicinâ Indorum. Lugdun. Batav., 1642.

merical Returns. Perhaps the simplest division is into dry and wet months; the dry ones being November, December, January, February, March, April, May; the wet ones June, July, August, September, October. I shall not enter into any details about the climate of Bengal. Its great features can be gathered from Table I.

Effect of Seasons.—Cholera is always present in Calcutta. There is not a month in the year in which deaths do not occur from it. The native population of Calcutta within the municipality may be roughly calculated at 400,000. There have been 46,697 deaths by cholera in the period from 1840 to 1850, and 45,823 deaths in that from 1850 to 1860. And in the case of a disease, the mortality of which, taken as a whole, varies so little, the deaths may be taken as showing very fairly the diffusion of the pestilence. We have, indeed, no record of attacks, only the Returns of deaths; but taking a long series of years they represent the prevalence of the disease accurately enough.

Attempts which have been hitherto made to connect the occurrence of cholera with particular passing states of the atmosphere, and especially with barometric pressure, or electrical conditions, or winds, or the uncertain ozone, have not been very successful. Meteorological changes which appeared to influence one outbreak were found to be absent in another, or the circumstances would be reversed. This was particularly the case with respect to prevailing winds. Still, though it is difficult to apply meteorological

changes in detail to explain the phenomena of the appearance of cholera, yet an examination of the following Table will, I trust, convince every one that meteorological changes on a large scale have much influence on the disease. For the Returns between the years 1830 and 1840 I am indebted to Sir J. R. Martin and Dr. D. Stewart; for those from 1840 to 1860, and for the meteorological Returns, to Surgeon-Major H. M. Macpherson.*

TABLE No. I.—*Showing Deaths from Cholera for 26 Years and from Small-pox for 29 Years, &c. &c.*

	Cholera.	Small-pox.	Rain fall.	Average temperature	Range of temperature	Prevailing winds.
			Inches.			
Jan. ...	7,150	1,425	0·21	63·4°	17·9°	N., N.E., N.W.
Feb. ...	9,346	2,845	0·42	74·2	17·3	N.N., E.N., W.
March	14,710	4,934	1·13	82·9	16·3	W., S.W.S.
April..	19,332	4,249	2·4	86·6	14·7	S.W., S.W.
May ...	13,335	2,261	4·29	89	13·3	S., S.W.
June ..	6,325	1,054	10·1	86·2	9	S., S.W.
July ...	3,979	555	13·9	84·1	6·4	S., S.E., S.W.
Aug....	3,440	223	14·4	82·6	5·2	S., S.E., S.W.
Sept....	3,935	188	10·4	83·8	6·6	S.S.W., W., N.W.
Oct. ...	6,211	147	4·72	81·1	8·8	W., E., S., N.W.
Nov....	8,323	132	0·90	75·4	14·2	N., N.E., N.W.
Dec. ...	8,159	576	0·13	66·9	16·4	Ditto.

Though cholera, as we have seen, is never absent from Calcutta, yet it has very strongly marked seasons of maximum and of minimum prevalence. If we take the simplest division of the Bengal year, we find that—

* Influence of Climates, 1856; Report on Small-pox, Calcutta, 1844; Indian Annals of Medicine, 1862.

Seven dry months yield . . . 80,405 deaths
 Five wet months yield . . . 23,890 „

Or the dry months produce about three and one-third times as many deaths as the wet ones. The great phenomena of the seasons are the amount of rainfall, the average temperature, and the range of temperature.

The average monthly rainfall in
 the dry months is 1·32 inches
 The average monthly rainfall in
 the wet months 10·70 „

So that we have at once a very marked difference of conditions, the monthly rainfall during the wet months being 9·38 inches more than in the dry.

The average monthly temperature of the
 dry months is 78·2°
 The average monthly temperature of the
 wet months is 83·48°

So that the average monthly temperature of the wet months is 5·28° higher than that of the dry months.

The monthly range of the thermometer
 is, in the dry months 15·7°
 The monthly range of the thermometer
 is, in the wet months 7·2°

The monthly range in the dry months is therefore 8·5° greater than in the wet ones.

It appears, then, that the dry months have the greatest range of temperature, while the wet have

the greatest rainfall and the highest average temperature.

But by carrying out the analysis further, perhaps some still more positive results may be reached, which are represented in a tabular form.

TABLE II.

	Deaths.	Average Temperature.	Range of Temperature.	Rain fall.
Hot—March, April, May	47,929	86·16°	14·7°	Inches. 2·68
Wet—July, August, Sept.	11,354	83·5	6·06	12·9
Cold—Nov., Dec., Jan.	23,632	68·63	16·1	·413
Transition—Feb., June, Oct. ...	21,882	80·5	11·7	5·08
Transition months in detail. { Feb.....	9,346	74·2	17·3	0·42
{ June	6,325	86·2	9.	10·1
{ October	6,211	81·1	8·8	4·72

In this table the year is broken up into four seasons, three of which are natural divisions, but the fourth is arbitrary, and is made up of the transition months, those in which there is the change from the cold to the hot season, from the dry to the wet, and from the wet to the cold.

Three hot and dry months have . 47,427 deaths

Three cold and dry months have . 23,632 ,,

Three hot and moist 11,354 ,,

While the three transition months

have 21,882 ,,

From this it is clear that the three hot and dry months produce fully four times as many deaths by cholera as the three hot and wet months, and about twice as many deaths as the cold and dry months, while the

cold and dry months slightly exceed the transition ones in their number of deaths. In what, then, do the most marked differences between the hot and dry, and hot and moist months, consist?

Not in the difference of average temperature, for it is only 2.66° in excess in the hot months, but in the range of temperature, which is 8.7° greater in the hot than in the wet months, and in the fall of rain, the monthly average of which is 10.3 inches greater in the wet than in the dry months.

The two most important agents in diminishing the prevalence of cholera appear, therefore, to be a heavy fall of rain, and diminished range of temperature. May we not assume that the two great factors in the production of cholera are dryness of the atmosphere, and a considerable range of the thermometer?

Mere reduction of temperature with dryness of the air are not sufficient to prevent cholera, for in the coldest and driest season we have twice as much cholera as in the rains; but then, in the cold season, there is a maximum range of the thermometer.

The transition months present, as might be expected, medium results: they do not, as a whole, produce as much cholera as the cold months, but they nearly do so. As regularly as the season comes round there is an increase of deaths by cholera in February, a diminution in June, and then another increase in October; and these changes are usually in the latter half of the months.

Of them, February produces most deaths; in

this month the range of temperature keeps almost at its highest, $17\cdot3^{\circ}$, and there is a sudden increase of $10\cdot9^{\circ}$ of average temperature. In June and in October the average temperature and average range differ much less from those of the preceding months.

I think the general result of our inquiry is very decided. Dry air, with high temperature, and wide range of the thermometer, is most favourable to the development of cholera; while moist air with high temperature, and small range, is most unfavourable to it.

Cold, and dry, and changcable weather occupy an intermediate place.

Such regularity is there in these laws, that I always hailed the arrival of the rains in June, if it were only for the knowledge that they would relieve me of much of the anxiety always attending the treatment of cases of cholera. In this there was almost a certainty. I also knew by experience that hot winds would not blow cholera away, although a heavy fall of rain would often seem during their prevalence to stop an outbreak.

Indeed, the earliest records we have of cholera in Bengal confirm these views. Mr. Hastings, writing to Mr. Scott, in April, 1781, says, from the 11th to the 21st of that month they had the great mortality in Calcutta.* It was observed on the first outbreak of the disease, that though it appeared to die away by October, yet it broke out again with renewed viru-

* Gleig's Life of Warren Hastings, vol. ii.

lence before the end of February, and cholera was first noted in the Jessore district in May; our earliest Calcutta records, after the disease was beginning to be fixed, or for the years 1818 and 1819, accord wonderfully with the results we have just given. There were 2842 deaths in the hot months, 491 in the wet, 1432 in the cold, and 1888 in the transition ones. The difference between the hot and wet months has, therefore, characterized the disease from the very beginning.

Unfortunately our Returns apply only to Calcutta, which is in one corner of Lower Bengal. They are, however, I could easily show, confirmed in a general way by jail Returns throughout Lower Bengal; but so much depends on the local circumstances of the jail, and the crowding together of prisoners, that I have thought it better not to introduce such Returns. I have already said that the climate and soil are throughout wonderfully uniform, and from what I have heard throughout a long series of years, I have no doubt that under ordinary circumstances the two seasons of maximum prevalence of cholera throughout Lower Bengal are the hot weather and the early part of the cold season, the former predominating.

These rules apply equally to the diffusion of the disease among Europeans in Lower Bengal, with this difference, that it is less common among them than among natives in the cold, and somewhat more prevalent in the transition months. The difference may partly depend on the imperfect clothing

of the natives, which makes the cold season depressing to them like winter; whereas, to Europeans, it is highly invigorating.

By Sir Ranald Martin, Mr. H. M. Macpherson, and myself,* Returns have been published showing results in general accordance with those just mentioned. I shall, however, not reproduce them here in detail, as they include the attacks of Europeans arriving at, or passing through, Calcutta under special circumstances, and the condition of soldiers is far from being so uniform as that of the native or even the European population of Calcutta. Still, as they extend over many years, and are of considerable value, although their numbers are small, it is worthy of notice that an abstract of our Returns of deaths among Europeans for twenty-seven years divides them thus:—hot months, 756; wet months, 206: cold, 243; transition, 324, or gives almost as many deaths in the hot months as in the whole of the rest of the year.

Extent and Fatality of Epidemics.—We have ascertained where it is endemic, at what season cholera is most likely to become epidemic. It would be also desirable to know the extent and the fatality of its epidemics in other parts of Lower Bengal, whether they have increased or diminished, and to learn what influence on the mortality of those attacked the season of the year may have. But such Returns as we have, bearing on season of prevalence, refer chiefly to European and Native soldiers, and to prisoners in

* Indian Annals of Medicine, vol. i.

jails, and owing to local causes, to crowding, and to marches, scarcely represent results that apply to the general population. One result, however, of an analysis of 1354 cases of cholera in Europeans in Calcutta, from Sir R. Martin's and my Returns of the General Hospital, deserves to be mentioned:— that the rate of mortality during the hot or cholera months was 56·2 per cent., and 45·2 during the others. The influence of the season of the year on mortality was suspected from the first. Mr. Jameson* mentions the fact of the mortality in Burdwan during the rains of 1817 and subsequent cold weather, being only about one in four, rising in the hot to four-fifths, and again decreasing during the rains to one-tenth of the attacked.

A few general conclusions are, however, received by all. Cholera rages more violently in places which it only visits epidemically than in spots where it is always present, and cases at the onset of an epidemic are most fatal. In all Lower Bengal the rate of mortality is wonderfully uniform; and it has certainly not diminished during the half century in which its ravages have been observed, although I am not inclined to suppose with some that the fatality of the disease has increased. Perhaps the best idea of the original mortality of the disease may be got from the Bengal Report. Mr. Jameson says that in the Nuddca district the disease attacked 25,400 people, of whom 16,500 died. This gives a percentage of mortality of 69·6; also that the Dacca

* Bengal Report, 1820, p. 169.

Returns gave 6354 cases, and 3757 deaths, or a percentage of 59·9. He also says generally that, when cases were left to themselves, the mortality was usually 50 and sometimes 75 per cent.; but that of those who were attacked in the earlier months scarcely any recovered without medicine. The local Calcutta Returns, giving 6 per cent. of mortality, carry their own refutation with them—21,876 cases and 20,878 recoveries. A disease with so small a mortality could not have created a general panic among the population.

Mr. Hastings, too, says that 879 deaths occurred in ten days of April, and I cannot learn that with its increased population there have ever been more deaths in Calcutta in so short a period.

All are agreed that the cholera of one season varies from that of another, just as the character of fevers changes. Some of the most striking variations are, the degree of blueness of the skin, the early occurrence of collapse, the amount of vomiting and purging, or of cramps, the frequency of consecutive fever, the degree in which the disease is amenable to treatment. In all essentials the disease is the same as when it first broke out.

If on these subjects we must be content with generalities, still our Calcutta Returns offer some interesting information respecting the influence of cholera on other diseases, and means for making a comparison with the other great epidemic disease of Lower Bengal, small-pox.

Influence on other Diseases.—It would have been

a matter of much interest if the Calcutta Returns had given information about the prevalence of diarrhœa at cholera seasons. Unfortunately they are not exact enough for any such purpose ; and it is difficult to give a general opinion on the subject in a place like Calcutta, in which bowel complaints always prevail to a large extent.

Both Twining* and Martin speak distinctly of a choleraic predisposition, of an epidemic influence with tendency to bowel complaints, during the prevalence of cholera, and this doctrine, including a dread of purgatives, has been generally accepted by practitioners in Calcutta, though possibly this dread, especially of saline aperients, may be somewhat exaggerated.

I have myself, in my own experience of epidemics of cholera among European soldiers, been struck by the small number of admissions to hospital from fever and other diseases at such times.

If we take the returns of the Calcutta population for twenty years from 1840 to 1860, and distinguish the months of the greatest prevalence of cholera from those of its least, the following results appear :—

During the six months of the maximum prevalence of cholera, there were 61,984 deaths by it, 68,181 deaths by other diseases.

During the six months of the minimum prevalence of cholera, there were 24,286 deaths by it, and 82,548 deaths by other diseases.

Or to put it in another way, in a series of twenty

* Diseases of Bengal, 1835.

years the maximum of deaths by cholera was in two Aprils.

Those two months yielded 16,193 deaths by cholera, and 9607 deaths from other causes.

The minimum of deaths by cholera, was in one July and in one August.

These two months yielded 2432 deaths by cholera, 12,232 deaths from other causes.

Another, though not so striking fact, points in the same direction: the applications for out-door relief at the Calcutta dispensaries in ten years were 333,050 in the most cholera month, 398,408 in the least cholera month—a difference of 65,856, and showing an average excess of applications of 6585 in the least cholera month.

The prevalence of cholera, therefore, has a very marked influence on the prevalence of other diseases. When cholera is epidemic, they are from one-fourth to one-fifth less prevalent than at other times.

While on the subject of epidemic influences, I may mention that, although deaths of birds in Jessore, and of cattle in the army, in 1817, were supposed to be caused by cholera, I have never known any instance of epizootics bearing any relation to that disease. There is, indeed, a disease among cattle called by the natives small-pox, having some analogy with Rinderpest, and also a disease among fowls, which have sometimes prevailed simultaneously with small-pox in Lower Bengal, but oftenest quite independently of it. As to birds flying away from epidemics, which has been alleged in

Europe, Calcutta crows, our commonest birds, are too clever to make a move, not knowing what spot they may find free of choleraic influence.

If we turn now to small-pox, we find the two diseases running their course side by side in the hot weather; and there is no reason to suppose that the one malady exercises the slightest influence on the other.

TABLE III.—*Showing Deaths by Cholera, Small-pox, and other Diseases for 20 Years.*

	Cholera.	Small-pox.	Other diseases.	Total.
1841	5,177	56	6,759	11,497
1842	6,545	32	7,441	14,018
1843	3,739	335	6,672	10,746
1844	5,811	2,840	6,882	15,533
1845	6,240	67	6,879	13,186
1846	6,427	78	7,178	13,683
1847	3,041	33	8,278	11,352
1848	2,502	107	7,863	10,472
1849	3,867	1,724	7,829	13,420
1850	3,348	4,430	8,199	15,977
1851	4,374	32	7,951	12,357
1852	4,189	59	7,544	11,792
1853	5,632	19	7,216	12,867
1854	3,082	113	7,448	10,643
1855	3,744	61	7,645	11,450
1856	4,540	178	8,344	13,062
1857	3,838	3,177	8,890	15,905
1858	5,195	123	8,075	13,393
1859	4,676	54	9,187	13,917
1860	6,553	64	9,154	15,771

Although at first sight there are many points of analogy in the course of small-pox and of cholera—for instance, their being never absent from some portion of Calcutta, and their both blazing out in the

hot weather, yet we still find they differ much in their courses.

In a series of years the most striking differences are these—the first half of the year produces 60,248 deaths by cholera; the second half 34,097 deaths, or little more than half as many.

The first six months of the year produce 15,768 deaths by small-pox; the second six months only 1821 deaths, or scarcely one-eighth as many.

Cholera again is more or less epidemic every year of the twenty; and in twenty years its greatest variation has been from 2502 deaths in 1848, to 6653 deaths in 1860.

Small-pox is only epidemic in certain years; it was so in four years out of the twenty, and taking a later period than that of these Returns, once in the last five years; in twenty years its ravages have varied, from only 19 deaths in 1853, to 4430 deaths in 1850.

Other points of difference are, that the maximum prevalence of small-pox takes place a month earlier than that of cholera; that its minimum prevalence is not during the rains but at their end, and that it is not in any degree influenced like cholera, by the cessation of the rains in October. Its decrease, too, takes place before the setting in of the rains. But perhaps the most striking difference between the two diseases is shown in the suddenness with which cholera breaks out, whereas small-pox always gives indications of its advent in the months of November and December of the preceeding year.

I trust that the interest attaching to the subject of epidemic influence will save me from the charge of wandering too far from the subject, if I add a few words about other diseases also prevailing according to season in Lower Bengal.

With respect to other eruptive fevers, Dr. D. Stewart pointed out long ago their prevalence at the same season with small-pox and cholera. Measles are usually epidemic in January, February, and March, or a little earlier in the year than the latter. Varicella occurs at much the same season. (True Scarlatina is unknown.)

Vaccinia, again, is perfectly regular in Calcutta throughout the cold weather, and the beginning of the hot dry months; in the rains it degenerates and crusts do not form, but as the weather gets colder, the vaccine improves again, and by the end of November has returned to its normal standard.

Unfortunately, there is no statistical evidence on a large scale that shows the prevalence of Fever in Lower Bengal in civil life; but such returns as I have examined go to show that it is commonest in natives in the rains and in the early cold weather. Twining says this; and Dr. Elliott, in his report on the epidemic fever which has of late years been devastating Bengal,* says that from 15th June to 15th November is its great season of prevalence, and that it abates during the hot season, "when the poison seems to be diluted and dissipated by the sun."

* Report on Fever, by Dr. J. Elliott. Calcutta, 1863.

In like manner, as far as can be gathered from imperfect Returns, dysentery is much commoner among natives in the wet and the cold than in the hot months.

It would thus appear that the two great endemic diseases of the country—fever and dysentery—are least frequent during the chief cholera season, and begin to increase at the season when cholera dies away.

To return from this digression, we have now ascertained what is by no means generally admitted by the principal authorities on the subject, that atmospheric changes as indicated by temperature and rainfall, have the most marked influence on the diffusion of cholera, and possibly on the mortality it occasions. We have also seen that cholera influences the prevalence of other diseases, and that its course differs very materially from that of the eruptive fevers, and other great diseases of the country, although the prevalence of all is more influenced by season of the year than by any other cause which we have been able hitherto to recognise.*

* Cholera shows a tendency to periodicity everywhere. Its season of prevalence in Bombay is much the same as in Calcutta. In the north-west provinces of India, which it visits epidemically, its season is about two and a half months later than in Lower Bengal. In Europe the late summer and autumn months are the time of its greatest prevalence; but there seems to be a difference between cholera where it is endemic and when it is travelling. It has far more fixed rules in its home than elsewhere. To follow cholera on its travels would be beyond the scope of these pages.

CHAPTER II.

LESS APPRECIABLE CAUSES.

* * * aut ipsâ sæpe coorta
De terrâ surgunt, ubi putorem humida nacta est.
Intempestivis pluviisque et solibus icta.

* * * * *
Quippe etiam nullo cessabant tempore apisci
Ex aliis alios avidi contagia morbi. LUCRET.

SOME further influences demand our attention—malaria, contagion, and locality. So much has been written on the two first, that I shall dismiss them with a very brief notice.

Malarious Influences.—Although we are entirely ignorant of their nature, and cannot reduce them to laws of temperature or of electricity, of moisture, or of atmospheric pressure, still their existence is generally assumed, just as that of a cholera poison. That such influences have their share in originating cholera is admitted by all Indian observers; to multiply examples, or to insist at length on this point, appears to me to be quite unnecessary.

I would merely say that inundations have always been considered the great generators of malaria, when the waters begin to dry up; and that in a Bengalee village, after an inundation, there is sure to be a severe epidemic of fever, or of cholera, or of both together, or of first one and then the other. Dr.

Wise, writing of Eastern Bengal, says,* when fever and dysentery were very common and fatal in the jungle, cholera was committing great ravages along the exposed parts of the retiring river Megna. In such cases there can be no more suspicion that the cholera has been imported than the fever. Inundations in Lower Bengal take place early in September, and they begin to dry up in October and November. This must not be left out of sight, in considering the increase in the amount of cholera among natives at that season. But we meet with contradictions everywhere; if malaria produces cholera when it is most abundant at the end of the year, why is cholera far most frequent in the hot months, when malaria is considered to be least so? And if in such cases there is a spontaneous generation of cholera, why has it only within the last fifty years become so intensified, while this source of the disease has been always in existence?

Contagion.—I shall say very little regarding the general question of contagiousness. While admitting that human intercourse has a share in the propagation of the disease (and it is impossible to resist the evidence that at certain times cholera is contagious), still I must assert that it is contagious in a very slight degree in Lower Bengal. I can only add my evidence to that of my distinguished predecessors at the General Hospital, Mr. Twining,†

* Cholera, by T. A. Wise, M.D. Cork, 1864.

† Diseases of Bengal, 1835.

and Sir R. Martin, and say for a later what they have said for an earlier period. It is scarcely ever the case that the attendants who are employed to rub the extremities of cholera patients fall sick. I have often seen the most beautiful devotion of native servants to their masters and mistresses in this disease; they have no dread, and do not lose heart, as European soldiers attending on their comrades are apt to do. The sweepers who remove the excreta, and the washermen who wash the clothes, never suffered, although there was little or no employment of disinfectants. I have known of an orderly sleeping the whole night in the bedding on which a cholera patient had just died. I have never seen a medical officer or subordinate on duty in hospital attacked; although a native assistant of mine once succumbed during an epidemic, which he was engaged in treating from house to house. For a series of twenty-five years at least, only one resident medical practitioner has died of the disease in Calcutta. I never had reason to imagine that the performance of post-mortems was dangerous to myself or to my assistants. Like others, I have had occasion to spend hours, I may say days, in a cholera atmosphere, and never took any special precautions; but I never had the disease, and no European in the same house with me ever had it.

Cholera attaches itself to Places.—Cholera appears to be able to attach itself for a time at least to particular spots, as to certain houses, streets, or barracks, or even to boats or ships, encamping grounds or banks

of rivers. It generally selects inhabited spots, and, like most other diseases, it finds its nest where there is most population and most filth. A village in Lower Bengal may be free from cholera for a time, but we have seen that Calcutta never is. Undrained Calcutta remains a lasting proof how certain favourable conditions form a nidus for disease: though much money has been spent—little short of a million sterling—the new system of drainage for the European quarter alone has not yet come into operation. Yet there appears to be something beyond any mere filthiness of locality.

A good many years ago the large airy houses in Middleton-row were almost deserted, being considered a hot-bed of cholera. This was attributed to a tank in the neighbourhood, which had been filled up some years previously. There has since then been no change in the drainage, the class of people that live there are the same in habits as their predecessors, only they are less wealthy, yet Middleton-row has no more cholera now than any other part of the city. I know another locality in Calcutta where cholera used not to be common in former times, but in which there have been many cases of late years, the only change in its neighbourhood being the excavation of an excellent tank of water. What has been said of neighbourhoods applies equally to particular houses, which, in common parlance, “have got a bad name for cholera.” But cholera will sometimes localize itself not merely in a particular barrack or ship, but affect only one side of it. Sometimes

defective sanitary arrangements may be discovered that seem to account for this, but much more usually none. The state of the latrines in barraeks often bears the blame, but no such cause exists in ships. On the Ganges, I have known cholera eling for a fortnight to particular boats, yet it could not be discovered that these boats differed in hygienic conditions from others that were not attacked, or that the hygienic conditions of the attacked boats were in any degree different during, from what they were before or after, the attack.

It was long supposed that there were certain localities which cholera would never reach, owing to peculiarity of geological formation or height above the sea. Gwalior was considered one of the exempted spots, yet it has had at least two severe visitations, and it is known that the mountain sanatoriums, notwithstanding the elevation of more than 6000 feet above the sea, cannot always count on exemption. Undoubtedly no spot in Lower Bengal is safe from its ravages. I know not on what evidence it has been supposed that the Laterite formation is a safeguard against it.

Crowding together and imperfect ventilation have doubtless often a great deal to say to this seeming fondness of cholera for particular places, and in what follows respecting its attaching itself to the river, it may be borne in mind that these causes almost always exist, more or less in sailing ships, in country boats, and even in steamers with troops. I never heard of one of the hundreds of Europeans who go in

steamers to the Sandheads from Calcutta for change of air, getting cholera; but in such boats there is ample space.

Attaches itself to the River.—The apparent fondness of cholera in Bengal for one particular kind of spot, if one may say so—that is, the banks of the rivers Hooghly and Ganges—is specially remarkable. For a ship to come up the Hooghly during the cholera season and not have a few cases of it is very unusual; in the old days, for a regiment, European or native, proceeding by water, to escape it was equally rare. Even when the transit was shortened by the aid of steam, a detachment of Europeans seldom got off scot free; and I have read but recently of the frightful sufferings of coolies (closely packed, no doubt) in steamers proceeding to the tea plantations in Cachar, scarcely inferior to those of the unfortunate men lately abandoned in the *Eagle Speed*.

Ships going into the Hooghly constantly get cholera on board. So sensible are naval men of this, that captains of her Majesty's vessels often keep their ships at the mouth of the river, or at Diamond Harbour, in hopes of escaping the disease, and in this they are often, though not always, successful. Captains, as a general rule, attribute cholera to something caught by the men on shore. It has been attempted to make out that the ships lying much in shore, and near the mouths of the sewers, suffer most, but there is little of certainty in this. Sometimes when three ships have been lying together at moorings, the centre ship has had cholera,

whilst those on either side have escaped. Moving a ship from the shore to midstream will often serve to stop cholera, at other times be of no avail; generally any change of place does good. The only certain way of stopping cholera without sending the crew on shore, is to go to sea. A vessel is pretty sure to have a case or two while dropping down the river; but as surely as she goes to sea, so surely does she lose her cholera. This applies to coolie ships, as well as to ships with European passengers.*

Such a thing has happened as cholera breaking out at sea among coolies a fortnight after leaving Calcutta, but it is the rarest thing possible; and granting the unfavourable influence of crowding and defective cleanliness, it is surprising that it is not more common, especially in country ships. One of the best known instances is that of the *Sultany*,† which left Calcutta on February 10th, 1854, with a crew of 80 men, and with 375 emigrants. It had no cholera going down the river, but a fortnight after leaving the Sandheads, or on February 29th, cholera broke out, and thirty of the passengers died. The ship reached the Mauritius on the 24th March, and was believed to have brought the disease to the island. The fact of cholera being already in the island does not concern us. No such outbreak more than ten days

* The Hygiene of the Army in India, London, 1864, by Mr. Stewart Clarke. His statements have been confirmed to me by Dr. J. M. Miller, of Southsea, who has also had large experience in such matters.

† See Dr. Clerihew's Report, *Medical Times*, vol. xiii.

from the Sandheads has ever occurred in homeward-bound English vessels, as far as I know.

With the case of the *Sultany* before us there is, however, no difficulty in supposing that Pilgrim ships from Bombay, or Madras, or even Caleutta, may carry cholera with them to the Red Sea, their crowding and filth being well fitted for the ineubation of the disease. Indeed, although I have myself known the baker of a large steamer die two days from the Sandheads, and the disease not spread, crowded though the steamer was, I believe there is no doubt that at least on one occasion cases of cholera have occurred among the crew of Indian steamers after their arrival at Suez.* Still the fact remains that ships once fairly on the voyage home never get cholera at sea, and it has never broken out with natives more than three weeks after leaving the Sandheads. On the whole, it may be said that sailors get cholera by visiting Caleutta, and lose it by going to sea.

As bearing on what has already been said of the period of the year at which cholera prevails most, it may be added that the risk of getting cholera in the Hooghly, either after arrival or on the way down (on the way up it is comparatively rare), is infinitely greater in the hot than in the wet or cold months, and this is a matter of much importance with reference to the sailing of troop or coolie ships.

* I have the authority of Mr. John A. Harvey, of Bayswater, for this.

The water of the Hooghly, although the stream is large, is, it is well known, full of impurities, and is cleaned very imperfectly before it is put on board ship. Yet captains of vessels are quite satisfied with it, and never on the voyage home attribute any bad results to its use. Invalids with chronic diarrhœa never complain of its having any injurious effects, and there never has been an outbreak of cholera at sea for which it could be fairly blamed. The ordinary drinking water of Bengal is never free from impurities, especially organic ones. Yet it is only at some seasons that cholera prevails, and an epidemic ceases after a time without the drinking water being changed.

Pettenkofer considers that the dampness of the banks of rivers accounts for their producing cholera; but I shall presently allude to some of his theoretical explanations.

The whole question why cholera attacks a fleet, or a town, or a barrack, or a jail, or the banks of a river, for a time, and then dies out—how one part of a station suffers, while another part escapes, how cholera may be epidemic in a district, yet not reach its jail, or prevail in the jail only and not in the district, is still wrapped in mystery.

CHAPTER III.

PREDISPOSING AND EXCITING CAUSES.

*Nonne vides etiam cæli novitate et aquarum
Tentari, procul à patriâ quicunque domoque
Adveniunt* * * *

*Omnia complebant loca tæctaque quo magis æstu,
Confertos ita acervatim mors accumulavit.*
* * *

*Hæc igitur subito clades nova pestilientiaque
Aut in a quas cadit aut fruges persedit in ipsas
Aut varios hominum pastus.*

LUCRET.

It had long been observed that newcomers were most liable to be attacked by cholera in Calcutta. But Mr. H. M. Macpherson has been the first to place on a statistical basis the very interesting fact, that among the Europeans in Calcutta, that is, persons of pure and of mixed blood, only twenty-four per cent. of cholera deaths occur among the residents, while seventy-six per cent. of the deaths by cholera happens among the non-resident population, that is, persons visiting or passing through Calcutta. The importance of this fact might be explained away by saying that of course we should expect new arrivals to suffer most. Attacks of cholera, fever, and of bowel complaint were only what was to be expected in newcomers; but Mr. Macpherson's analysis of the deaths during five years, shows that it is only to cholera that new arrivals are so specially predisposed.

There were among the—				Deaths.
Fixed population of Calcutta by fever				181
Non-resident	„	„	„	70
Fixed	„	„	by bowel complaints	292
Non-resident	„	„	„ „	193
Fixed	„	„	by cholera	174
Non-resident	„	„	„	544

Surely very remarkable results, and most difficult of explanation! Cholera is most likely to attack—

1. New arrivals, or those who have lately come from sea. The great majority of deaths occur among sailors or soldiers, who have just come in. A new regiment is very fortunate indeed if it passes through Calcutta without losing some men. It would be easy to multiply examples of this; for instance, H.M. 96th Regiment, which arrived from New South Wales in April, had not landed thirty-six hours before cholera of a virulent type broke out. Every professional man in Calcutta must have met with many cases of cholera in private life among those recently arrived. Some of the most striking cases of this kind have happened in young women and children.

2. Those who are travelling are specially liable to be attacked. New arrivals might perhaps be considered to come under this head, but they seem even more liable to suffer than people who have been some time in the country or natives, when they are moving about. It is notorious that among Europeans more cholera occurs in hotels and lodging places than elsewhere. Many of these houses are no doubt defective in sanitary arrangements, but I

believe that the fact is attributable more to something in the condition of the travellers than to the state of the houses they resort to. I have seen persons from the Provinces die of cholera in Calcutta in the airiest and loftiest private houses; and this too when no particular fatigue has been undergone. Under this head come travellers dying at staging bungalows; also, at least as one cause, the readiness with which, in certain districts, both European and native troops get cholera on the line of march. It is well known how pilgrims on their way through Lower Bengal and Orissa strew the road to Juggernaut with their bones. Natives travelling are just as likely to suffer as Europeans.

In some such cases the attack is attributed to passing through districts where cholera is prevailing; sometimes to taking up ground recently held by a regiment that has had cholera, or even that has not had it. But in an immense number of instances, I know of no satisfactory explanation of the circumstance; exhaustion from travelling has been suggested as the predisposing cause, but is in many instances quite inapplicable.

3. Those who are overcrowded suffer most. There is something in the massing of people together that favours the development of all disease. This is especially true of cholera. Just as in 1785, long before the disease became fixed in Lower Bengal, an epidemic of cholera broke out at the great fair of Hurdwar, so, according to Mr. Stewart Clarke, a fresh outbreak takes place nearly every year. The

more closely packed a regiment is, the more likely is it to suffer severely from cholera, and separating the men is one of the first steps towards stopping an outbreak. It would be easy to multiply instances of this in crowded barracks, in jails, and in ships, or among ill-housed railway labourers pigging together. I shall presently give an example of the bad effects of overcrowding in a private house, and shall now merely refer to a very frightful attack of the disease at Dum Dum in September, 1859, a month when, as we have seen, the disease is not common. This is the worst outbreak among Europeans I have known in Lower Bengal. In this instance the disease was mainly attributable to overcrowding and the various evils engendered thereby, for the men who were in roomy barracks escaped. It is, however, not to be forgotten, proving that the causation of cholera is always complex, that an outbreak, though on a much smaller scale, occurred at the same time at a station only ten miles off, where the accommodation was ample. Instances of the effects of overcrowding both in the European and native population must be familiar to every medical man in Calcutta.

4. My last head embraces a very wide variety of topics, on which it would be easy to enlarge; but I must be brief.

Cholera attacks all who are depressed. Although men in the highest health are often struck down, especially at the onset of an epidemic, yet it might be presumed that those who are weakened by any cause would be likely to suffer from cholera. The

poor suffer more than the rich, and among sick in hospitals, many cases of dysentery, a few of fever, and one or two of phthisis swept off by it are fresh in my memory. The prisoners in unhealthy jails readily become victims to it. Exposure to climatic vicissitudes and to the influence of malaria, along with bodily fatigue, partly explains the sudden attacks of regiments on the line of march, of railway labourers engaged in making particular cuttings, or of coolies sent to clear tanks of weeds.

Excessive action of the bowels from purgative medicine, diarrhoea from impure water, or any disorder of the digestion or bowels from excess in eating or drinking would come under this head, as instanced in H.M. 18th Regt. suffering at Christmas time—an unusual season for cholera in Calcutta, or in H.M. 14th at Berhampore, after a distribution of prize money. Among natives, abstinence during festivals, followed by excess of every kind, leads to similar results. And here it may be remarked that most violent cases of vomiting, purging, and cramps simulating cholera, have been clearly traced by me and others, sometimes to eating bad shellfish; and sometimes to copper poisoning from the cooking utensils. From the days of Hippocrates downwards, who is very full on the subject, indigestible food has been declared a cause of cholera, and an extravagant theory, started in Bengal, that rice was a great cause of it, has found recent advocates. But though irregularities in diet may sometimes be fairly blamed (and I once found a lump of cocoa-nut in the stomach of a boy after death),

it should be remembered that patients or their friends are so anxious to have some cause for an attack assigned, and Medical men are so often as it were compelled to assign a reason for their satisfaction, that irregularities of diet are often discovered that never existed, and it would be hard to say what article of diet has not at times in Calcutta got the credit of having produced cholera.

Those who are most alarmed are most likely to be seized, and confidence seems to be of use, both in warding off an attack and in struggling through it. The excessive alarms during epidemics are most injurious.

I have nothing definite to say of race. Africans enjoy no immunity from the disease.

But no strength of constitution, no regularity of life, no supposed acclimatization, no excellence of dwelling-house, no previous attack of it, no age, no sex gives security against this pestilence.

Cholera seizures appear to be most frequent in Europeans in the early morning, and in natives after a full meal, but there are no statistics on the subject.

I have no facts to bring forward regarding the period of incubation of the disease. It may be presumed that it is usually exceedingly short.

CHAPTER IV.

GENERAL PHENOMENA OF OUTBREAKS.

HAVING considered pretty fully some of the causes which appear to influence the prevalence of cholera in Lower Bengal, I shall now proceed to matters of more detail, and give a sketch of the way in which cholera occurs sporadically and epidemically; and, speaking almost entirely from my own experience, I shall first give a few examples of sporadic cases among Europeans, such cases occurring most commonly at the season of the greatest prevalence of the disease.

Sporadic Cases.—The first case of the season may very likely show itself in February, just as the weather begins to get hot. One is probably suddenly called early in the morning to a single case in a house, perhaps to two children, or rarely to a man and his wife, attacked at the same time. It is generally difficult to find fault with anything local to the house,* or to discover in what the particular house differs from others of its class (although some think

* Cesspools or privies are almost unknown about European houses.

differently on this subject, and almost always do discover what is wanted—a palpable cause). Thus, of first-class houses in the best situations that I have known for a series of years, I recollect one in which a lady died fourteen years ago at the epidemic season. There has been no death by cholera in it since. The house next it was certainly free from cholera for twelve years, when there was the solitary death of an infant also at the epidemic period.* In another house, standing in the centre of a park, free from jungle and away from all drains, a lady at the same season of the year suddenly fell a victim. Of course it was accounted for by her having tired herself shopping in Calcutta. The house had always been healthy before, and continues to be so. In another instance, while the hot winds were blowing as strongly as they ever do in Calcutta, a retired subordinate officer living in the General Hospital quarters was seized. He had taken an aperient that he was accustomed to use, and to this he ascribed the attack, of which he died. He had not been inside the hospital for many weeks, and there was no cholera in it; but on the day of his seizure a woman in a very airy ward, a patient for ophthalmia,

* It is worth while to note the behaviour of small-pox in this house. At a time when small-pox was not epidemic, a lady living on the upper story was attacked with it. No possible source of infection could be guessed at. There were three other Europeans living on the same story, one who had formerly had small-pox escaped, so did a child vaccinated two years before, but the third, who had been vaccinated as a child, got the disease in a modified form.

was seized with cholera and recovered. In none of these cases did the disease spread.

I give them as average cases, showing that even during the epidemic season the disease does not usually extend in good houses, or when there is no congregation of people. The same applies to natives in the European portion of Calcutta ; perhaps one or two servants (they are far more numerous, of course, than the Europeans) would die in the outhouses of the mansions just spoken of every two or three years, and the disease would not spread. Sporadic cases occur in a similar way in large native houses, but for obvious reasons the disease oftener propagates itself.

I shall next present an example of the disease suddenly showing itself in a very virulent shape, with great tendency to spread.

A Remarkable Outbreak.—A first-class ship arrived in the Hooghly in the early days of January. There was no cholera in the vessel coming up the river, or during the month. There was very little in the city of Calcutta. A party, consisting of a gentleman and his wife, European nurse, a young lady, and two children, landed in perfect health, on a Sunday. They went to a house in which there had been no cholera for several years, not, however, in a particularly good situation, and small for the party that was received in it. After their arrival, there was a total of eight adults and ten children living in the house. Of these, two adults and three children were residents, two adults and three children from up country, and the rest were the new arrivals. Five of

the new arrivals occupied a small room on the upper flat—that is, the three females and the two children. They had one bathing-room off it. The rest of the occupants of the house were partly upstairs and partly down. The nurse and children appear to have had slight diarrhœa during the week, and the children and the young lady ate on Saturday some rather indigestible native fruit. The children having slight diarrhœa, got a dose of Gregory's powder from their mother on Sunday morning. I was sent for at 8 o'clock P.M. of that day, and found one child far gone: she died at half-past twelve at night. The other child was in the earlier stage of the disease. About midnight the father had an attack of it, which was checked, and towards morning the nurse (who during the evening had felt ill, and had got a dose of rhubarb from her mistress) was seized. She was sent off to the General Hospital, close at hand, before 7 A.M., and she died there at 7 P.M. All who could possibly leave the house—*i.e.*, all but its resident occupants—were ordered out of it. The young lady, who had been in devoted attendance on both children, went at 11 A.M. to Wilson's Hotel. She was seized with cholera late on Monday night, and died at 4 P.M. on Tuesday. The second child, after a long struggle, rallied from her first attack, but in less than twenty-four hours had a relapse; however, she eventually recovered. One of the occupants of a room downstairs was suffering from chronic diarrhœa. No more cases occurred in the house, or in the servants' out-houses.

A few reflections on these cases naturally occur. The sufferers had just arrived from sea. They were crowded into a space quite unwarrantably small, and hence, probably, an attack of cholera at an unusual season of the year. All the four undoubted cases had suffered previously from diarrhœa, attributed to the eating of indigestible food. They unfortunately had aperient medicine given them, and no purgative is safe at such a time. None but those who lived in the room, and the father, who was constantly in it, were attacked. The cases, as in such sudden outbreaks, were peculiarly severe. Out of the four cases in which cholera was undoubtedly developed, there were three deaths. None of the other occupants of the house, and none of the servants, were attacked, not even the invalid with chronic diarrhœa. The immediate breaking up of the party appears to have exercised a most salutary effect.

When such an outbreak, and even worse ones, are possible in European houses, and when cholera so readily becomes epidemic, it seems wonderful that the whole native population is not swept off, considering the infinitely more unfavourable conditions under which they live. These conditions may be thus summed up:—Damp soil, often a quagmire a few feet below the surface—pools of dirty water—stagnant drains—impure drinking water—crowding together—collections of filth, luxuriant vegetation, hot and moist air.

An Epidemic.—But when a cholera epidemic fairly breaks out in Lower Bengal, it may be observed

well when it attacks an European regiment. Such outbreaks take place nearly every year, although they are seldom so virulent in the Lower as in the Upper Provinces. The epidemic attack, of which I shall give a short account, occurred in a fleet of thatched boats, a mode of transporting troops which is fortunately now abandoned :—We left Calcutta with a detachment of 400 rather sickly young Europeans on August 4th, 1842, or in the height of the rains. The boats were thatched, and many of them leaky, the roof of the hospital boat not high enough to allow one to stand erect. Still, the boats were average ones, as was also the commissariat. During the first month there was a good deal of fever, dysentery, and diarrhœa—sourish bread and bad water got the credit of provoking the two last—yet we had no cholera. On August 21st a man convalescent from dysentery, suddenly died with choleraic purging and collapse; but the case was not considered one of cholera, and there was no other case of the kind. The season was remarkable for a succession of violent gales. On September 8th, when we had been drawn up an hour or two on a bank below Patna, which was known to be one where we were likely to get cholera, but which we had to seek owing to the violence of the storm, and before any of the men had been many yards from the boats, the first case of cholera appeared—of course a fatal one. Next day we moved off, but the cholera accompanied us, attacking both Europeans and natives, and attaching itself to three or four boats in particular, and

getting worse when we lay for two days on a bank close to a native bazaar. In a fortnight, as we proceeded upwards, we thought we had got rid of the disease, but a last case showed itself singly as late as October 16th. We had altogether 18 deaths of Europeans.

It will be observed that the cholera did not attack us at first during the confusion of our start, or when we were in Lower Bengal, where there is most cholera, and where we were drinking the Hooghly, which is far more impure than the Ganges water. We got cholera whenever we reached a bank which was supposed to be a likely one for it, and before we had been there two hours. We were losing the disease, when it appeared to be again aggravated by our lying to for a couple of days. None of the officers, some sixteen in number, who lived in a superior class of boats, got the disease.

Endeavouring to see our way among these occurrences, here we have the choleraic element, so to say, displayed on the 21st of August, but no true cholera till September 8th. I attribute nothing to the bank on which we drew up, notwithstanding its bad repute; there was scarcely time for it to act on us. One must suppose that the choleraic element somehow attached itself to the fleet, and after a time developed itself, or that cholera was got from some of the villages on the banks which were suffering from it, or that the same state of air which produced it on the bank of the river produced it in the fleet. If the cholera attached itself to the fleet, it is curious that it did not attach

itself to a particular boat, for our first case of cholera was not in the boat in which the case of choleraic collapse occurred. The most minute examination could not detect any difference in the hygienic conditions of the boats that were attacked and of those that were spared, nor any difference as to drinking water.*

The popular theory of the mode in which water gets contaminated seems here entirely inapplicable. The water was not got from wells or tanks, into which there might have been infiltration, but from an enormous flowing river some miles broad.

* The year 1842 was remarkable for a great cyclone and for atmospheric vicissitudes. It was also a year of the maximum prevalence of cholera in Calcutta, and almost all detachments of European troops proceeding up the river were attacked with cholera. Strange to say, there is no presumption that any of them brought the disease with them from Calcutta. Attacks were variously attributed to bad water, to the boats being drawn up on unhealthy banks, and to communication with villages having cholera. In the case of a detachment of her Majesty's 9th Lancers, it broke out after the men had been made to wade to church-service through marshy ground and stand during service exposed to a September sun. Professor Alison, in alluding to one of these detachments, says he was informed that there was no cholera in Calcutta when it left, and that communication with an infected village was prevented. Now there was plenty of cholera in Calcutta that year, and with the crowd of natives attending a fleet, it is impossible to insure non-communication with any village.

CHAPTER V.

THEORIES OF DIFFUSION.

*Ratio quæ sit morbis, aut unde repente,
Mortiferam possit cladem conflare coorta,
Morbida vis hominum generi.* * *

LUCRET.

THE great facts that have forced themselves on our attention in Lower Bengal are, the influence of season; the great tendency of cholera to attack travellers; its development where there is crowding or neglected ventilation; its fondness for shipping and the banks of rivers; the way in which it attaches itself to ships, but almost universally disappears from them at sea; the fact of Medical men and hospital attendants and washermen not suffering specially from it.

The more we descend to particular facts, the more difficult it is to reconcile them with any theory.

But I cannot leave this part of the subject without inquiring shortly how far these laws of prevalence, undoubtedly true in the districts where cholera is endemic, accord with the most popular theories in Europe. My remarks apply exclusively to facts in Lower Bengal. I know that in some other parts of India they appear to point differently.

The cholera poison is supposed to be contained in

the evaeuations, and as I understand, according to Snow, to reach the system chiefly by its infiltration into drinking water; or, according to Pettenkofer, by being absorbed into porous soil, and becoming active by emanations in places where the ground-water comes near the surface, and especially at times when the ground-water begins to descend; particular geological formations and rocks in general are unfavourable to its production; or, according to one part of Dr. W. Budd's views, the cholera poison at times dries up and spreads in the form of impalpable dust.

At first sight, the contaminated-water theory appears to be supported by the immense prevalence of cholera during the dry season, when the drinking water is undoubtedly at its worst, and the fall of rain putting a stop to cholera by the supply of fresh water would seem to complete the application of the theory. That bad drinking water has something to do with the production of bowel complaints, and possibly of cholera, is a very general, and probably a well-founded opinion. In all ages, on the outbreak of pestilence, there has been the suspicion of the wells being poisoned. But in this case, what is the probability of the water being tainted by cholera evaeuations? We know the habits of the Bengalees and that their villages have an *odor stercoreus* around them; but at what season are the evaeuations likely to be washed into the tanks or streams? Not, certainly, in the hot weather, when everything is dried up, and the excretions are not likely, even with the help of an occasional shower, either

to run off into tanks or infiltrate into wells. The rains are the season when there is most likelihood of this. Yet during them cholera does not prevail; and how can contaminated water account for the increase of cholera in October, a season when the drinking water is at its best? or how are sporadic cases, in which no change has been made in the drinking water used, and when it has uniformly been carefully filtered, to be explained?

Nor does Pettenkofer's* theory help us; it attributes a good deal to a porous soil and to certain geological formations. Porous soil we have in abundance in Bengal, and that is its general characteristic. The only non-alluvial soil we have in Lower Bengal is on its western edges, where the curious formation of Laterite, a porous rock, occurs. I have examined the Jail Returns in such districts, and compared them with those of alluvial ones, with this result: that cholera was, during the ten years of which I have examined the Jail Returns, more prevalent on the Laterite than on the alluvial soil, in the proportion of 2.64 to 1.13 per cent. This, however, is merely a question of detail for Pettenkofer to decide, whether he considers a Laterite or an alluvial soil the best nidus for cholera.

But leaving that point undecided, does the ground-water theory help us? It may be remarked that everywhere in Bengal the ground-water is near the surface. According to Pettenkofer, when the ground

* Zeitschrift für Biologie, 1865.

water begins to recede, cholera begins to prevail ; and here we have the fact of cholera having a second yearly period of increase in October, when the water begins to recede ; but how is it that we have so little cholera during the rains, when the ground-water has almost reached the surface, and coffins are often lowered into water ; and above all, how is it that cholera is most prevalent in the dry season, when the ground water is at its lowest ?

Dr. W. Budd's theory seems at first sight to suit the circumstances of the case best. Dry dust is most abundant in the hot months, when cholera prevails most. The spread of the dust is again stopped, like that of cholera, by the fall of rain in June, "owing to the tendency of the poison in a moist state to rapid decomposition."* When the rainfall ceases in October the dust begins to travel again, and sows a new crop of cholera. But then the dust and the cholera should go on increasing together during the cold-weather months, as the country goes on drying ; but the cholera does not increase during those months. There is no sudden augmentation of dust, although there is of heat, when cholera increases suddenly in the end of February. Dr. Budd's theory suits the case of regiments getting cholera on the march, which has been attributed to their taking up ground previously occupied by troops with cholera ; but it has broken out on ground occupied previously by regiments which

* Associat. Journal, 1854.

had not suffered from cholera; also on ground that had not been occupied for years, or on ground that had never been occupied at all.

I believe no positive evidence has been brought forward in support of this theory, as in the case of water.

Respecting the view of the exclusively contagious nature of the disease, which also is a popular one—how is it to be reconciled with the immense influence which we have found general climatic influences exercise on the prevalence of the disease?

We have already shortly alluded to the malaria theory, but found it not of general application.

I do not know whether any of these theories can be made to explain the excessive liability of travellers to be attacked.

To enter at large into the discussion of these interesting questions would be beyond the scope of these pages, but the time has not yet arrived when we can accept any exclusive theory, whether based on special views of the nature of the cholera poison and its mode of diffusion, on contagion or on malaria.

PATHOLOGY.

CHAPTER VI.

DESCRIPTION OF DISEASE AND MORBID APPEARANCES.

THOUGH it is not the object of these pages to treat cholera in much detail, it is necessary to give a short account of its symptoms, as they have been so often described; and as it is my wish to take as general a view of the disease as possible, it may be well to glance at the early history of the disease, before it assumed its permanent epidemic character. It is thus described in "Charaka," the most ancient of the medical Sanscrit writings :*—

"*Cholera Bisuchika*.—The patient first feels pain in the abdomen, as from indigestion, followed by frequent stools and vomiting, great thirst, increased pain in the abdomen, with fainting, giddiness, yawning, and cramps in the legs. The colour of the body is altered, accompanied with shivering pain in the chest and head. The unfavourable symptoms are great restlessness, no secretion of urine; the lips, gums, and nails become blackish, with frequent vomitings and faintings. The eyes become sunken,

* Wise's Hindoo Medicine, p. 330.

voice feeble, the joints loose, with great debility and insensibility. Such a person will not recover."

Though Hippocrates was evidently familiar with the disease, he has given no detailed account of it, but the following symptoms are gathered from the descriptions of Celsus, C. Aurelianus, and Aretæus, which have been often quoted:—"Passing upwards and downwards of bile, variously coloured—at first like water, then like washings of raw flesh; sometimes white, sometimes black, or of various colours. Should the disease increase, the patient grows faint, the muscles of the arms and legs are cramped, the nails grow blue, the extremities cold, the body is covered with sweat, the bladder is spasmodically affected, and the urine suppressed; the voice is lost, and the pulse becomes exceedingly feeble. There is great feeling of heat and intolerable thirst; hurried breathing; the face is collapsed, and the eyes red towards the end."

Neither Sydenham, Willis, nor Rivcrius have given such complete accounts of the symptoms, and D'Orta and Bontius have added little to them; but the two first mention the epidemic prevalence of Cholera in autumn, and Riverius* is the earliest author, as far as I know, who mentions the second stage of febrile reaction distinctly. Celsus does indeed talk of a febricula, but Riverius discusses the propriety of bleeding in it. Whatever opinion we may entertain as to the identity of the old and the modern disease,

* L. Riverii *Præcos Medicinæ*, lib. ix. cap. 9. Francofurti, 1666.

it is of some importance to have ascertained that three hundred years ago names still in use in India, were applied to the disease, and that from the earliest date it has been treated on the same principles as those on which the modern Cholera has been commonly handled.

The following is a short account of the symptoms and the course of the disease in its more aggravated form, as it is commonly described by authors :—

An attack of Cholera sometimes comes on suddenly, without warning. Oftener there has been more or less discomfort for a day or two, with some diarrhœa, to which, if severe, the name of cholérine was given in France ;* this is the early stage of the disease, and it has been said that people have died in it without its further development, as well as carried the disease on them to other places. Such cases are, however, very rare, just as the sudden deaths in which people are said to have been stricken down without any diarrhœa or vomiting at all.

If the premonitory stage is passed or has been

* Another French name applied to Cholera is *mort de chien*. It is a corruption of one of the native names mentioned by Del Huerto, *mordæe*, *mordke*, *mordechen*, *mort de chien*. This name, Colonel Chambers, of Oxford, tells me, still exists in a Mahratta word for Cholera, *mōdshī* or *morshi*, from *mōdnen*, to break or tear. Dr. Rost, of the Asiatic Society, has supplied me with another etymology of the word *mordxi*: *mari* is Sanscrit for pestilence, and *daka* is the Cashmere word for Cholera, *dak* meaning obstruction in Punjabee ; hence *mordxi* may be *mari daki*, pestilence of Cholera. The *mari* is added much in the same way as we have added morbus to Cholera.

wanting, the patient next evacuates the contents of his stomach by vomiting, and then goes on vomiting a watery fluid with white flakes in it, and rejects almost instantaneously everything he swallows. Enormous alvine evacuations take place simultaneously with, or often precede the vomiting. They empty the contents of the intestines, and are at first yellow, but soon cease to be so, and present the character known by the name of rice-water motions; they succeed each other with great rapidity, and their smell is characteristic. There is an inexpressible feeling of faintness; the pulse gets accelerated and rises to 120 beats; its strength diminishes in proportion to its rapidity; the beating of the heart becomes weaker; the respiration is anxious and accelerated; the patient complains of dyspnœa, though examination of the chest shows only altered intensity of sounds. The voice becomes feeble; it has a peculiar sound, which once heard can never be mistaken; there may be swimming of the head or ringing in the ears, incessant restlessness and jactitation of the limbs. Syncope is not common. Painful cramps are felt in the arms, the fingers, and especially the calves of the legs. By this time the patient is so weakened that he must lie down. The face expresses the greatest suffering and anxiety, the features are pinched and shrivelled, and the eyes hollow, with black circles round them. As the disease runs on, the body gets cold, the face often becomes bluish, the fingers become of the same colour, and more especially the

nails, while the skin looks as if it had been macerated in water. If you pinch the skin, it retains the impression a long time; all elasticity is gone. The whole body usually becomes thinner from the drain of fluid from the cellular tissue; cold sweats break out; the secretion of bile and of urine is suspended; the urine from the commencement has been scanty, and contains albumen.

In some rare cases, the patient remains twenty to thirty hours in this state, and then reaction sets in.

The stage of complete collapse succeeds. The blueness has usually increased, though this is not always the case; the skin becomes cold, and is covered with a clammy sweat; its feeling to the touch has been compared to that of a corpse, or of a frog, or of the nose of a dog. The tongue is blue and cold, the thirst is most intense, and the patient complains of internal burning, and cannot bear any covering. The heat in the axilla, as shown by the thermometer, may not be much under the normal; in the mouth it may be as low as from 86° to 90° , or even lower. When the collapse is intense, the internal heat increases, and late experiments in Paris show that the temperature rises to about 103° in the rectum. The purging and the vomiting generally become less. The stools are involuntary and often cease entirely. The voice gets weaker, the breath of the patient feels cold, the dyspnoea and oppression increase; the pulse becomes imperceptible, sometimes the pulsations of the heart cannot be distinguished at all: we may cut the temporal artery, but no blood escapes.

If we open a vein, it is only by squeezing the arm that one gets a few spoonfuls of dark, tarry fluid, and if got to flow, it coagulates imperfectly. The general coldness increases. The eyes are sunk. The senses are a good deal blunted; the hearing gets dull and the vision is disturbed; the patient is inclined to a slumber, which resembles the deep sleep of exhaustion after severe bodily or mental exertion. Nevertheless the intellectual faculties are unimpaired, and you will be surprised to find that if you rouse a patient from his seeming stupor he is quite sensible. It is very rare in this stage to have delirium. Death usually comes on insensibly, while the patient seems to be lying in a state of syncope. Death is preceded and immediately followed by a remarkable rise in the temperature of the body. Such are the general symptoms of cholera in the stage which has given it the names of *algide* and *asphyxia*.

If the patient does not die in collapse, a great change takes place, often while the stage of half stupor continues; the pulse becomes gradually perceptible and begins to regain its force, the cold disappears gradually from the skin, and the blueness and shrivelled look begin to disappear, the voice gets a little stronger, the conjunctiva becomes more injected; there will probably be no vomiting and very little or no purging; any motion now passed will be much less copious, less watery, and not so white; it may be first greyish or mud coloured, but after a time traces of bile will appear; the re-establishment of the urinary secretion, which does not

often take place so early, is hailed as a most favourable symptom. The urine always contains a considerable quantity of albumen. This stage is attended with more or less of febrile reaction.

Sometimes to this state succeeds convalescence in a day or two, without any relapse or other bad symptoms; but this is not frequent. Occasionally, if the patient has been allowed to rise, sudden syncope has proved fatal. Sometimes the patient when seemingly mending, relapses again, and such a relapse, if it proceeds to any length, is usually fatal. In other cases, irritability of stomach and tendency to diarrhœa continue for many days, while in some all the phenomena of typhoid fever appear: the tongue becomes dry and hard; sordes gather about the teeth; there is much coma, oppression of the head, and low delirium, sometimes congestion of the lungs, and occasionally there are at a later period exanthemata and inflamed parotids. The patient may gradually struggle through this, or begin to pass bloody stools, or get suddenly delirious (I have seen acute mania) and die. Sloughing of the cornea sometimes appears in natives of India. Excessive reaction is usually considered to induce two states: one, the less common, of excessive febrile action, the second and commoner resembling low typhoid.

All the phenomena detailed above differ in various epidemics, and at the commencement and end of the same epidemic. The suddenness of the attack is one of the points in which there is most variety; the amount of vomiting and purging or of cramps, the

date of the setting in of collapse, also the degree of blueness of the skin, the liability to secondary fever :—on scarcely any of these points is it possible to procure precise information. But with respect to the occurrence of fever, Dr. Buhl,* in his carefully-watched cases, says that in 163 recoveries, 121 came round almost suddenly, while 42 had to struggle through secondary fever; and adding together those who died of typhoid and those who recovered, he makes out that about one-third of all the cholera cases got typhoid. Of those 103, there died 63. I found in the General Hospital, Calcutta, that among Europeans, for a period of ten years, one-fifth of all the fatal cases of cholera were cases that had got through the stage of collapse.

Cholera has been in a general way divided into the more violent, or *foudroyante*, and the milder. The former is marked by the extreme rapidity with which the symptoms of collapse come on, the great amount of cyanosis, the discomfort about the præcordia, while the number of evacuations seems a secondary matter. In the other the disease runs its course more slowly, and the collapse does not set in so early. Of the two, the latter is by far the most common.

There is also a division of cholera into moist and dry. This latter variety of the disease has come down from the days of Hippocrates. Sydenham saw it only once, and Riverius calls it "*longe infrequentior*" in

* Zeitschrift für Rationelle Medicin, 1855.

his day. Dr. Buhl has never met with it, except in a foetus. Dr. Gull seems to have seen some such cases. I have often heard of them, but they have never occurred in my own tolerably extensive experience, spread over twenty-four years. I never knew a case in which there was not some vomiting or purging.

The *post-mortem* appearances vary according as death occurs during collapse or after reaction. In the first case, the blue colour of the face and of the limbs is retained, and there is more or less of this discoloration in other tissues. The exterior of the intestines is often of a violet hue. When the small intestine is opened, it is found pale, discoloured in places, and showing in different parts shades of red, pink, or violet colour. There is often œdema of the mucous membrane, and it usually presents, through the greater part of its extent, prominences of small, hard, opaque bodies, which are enlarged Brunner's and solitary glands. This is a very constant appearance in Cholera, but not in any way special to that disease. The intestines and stomach contain more or less of a white flocculent liquid, the equivalent of the rice-water stools; occasionally some article of food remains in the stomach. The sub-mucous tissue is often distended with a greyish-white thick fluid. Besides the white, the intestines sometimes contain a fluid of pale colour, or with traces of bile or somewhat bloody. The large intestine is comparatively little affected. The vessels of the mesentery are often gorged with blood. The lymphatic vessels are normal; the liver, of the usual size, commonly

contains little blood; the gall bladder is distended with bile; the spleen is rather small; the kidneys are full of blood, especially in their cortical layers. The bladder is contracted and empty of urine, and it is said that sometimes the flocculent matter of the evacuations has been found on its internal coats. The lungs are generally elastic, pervious to air, containing little blood, and the bronchi sometimes contain the white matter of Cholera (?). The back portion of the lungs contains more blood, and is darker. The heart is more or less contracted, with some ecchymoses on its surface. Its right side is usually filled with blood, the right auricle distended by its contents. The cavities on the left side contain less blood. The blood of the heart is black and tarry, and extends in that condition into the stems of the veins and arteries. All the serous membranes of the body, especially of the peritoneum, are drier than natural. The fluid in the head and spinal cord is little diminished; but the vessels of these parts are more or less gorged with blood. The substance of the brain is more or less congested and full of puncta. On the whole, the arterial system is empty, while the venous is very full.

In cases in which death occurs after reaction or in the secondary fever, the cyanosis has usually disappeared. There is often œdema of the pia mater, with the arachnoid muddy and thickened, and containing more water than usual; the ventricles are enlarged by collections of water. The brain substance is dry, and bloody points are not so numerous. The lower portions of the lungs are often œdematous,

or are the subject of interlobular emphysema; patches of lobular hepatization are common. The heart is filled with dark tarry blood, especially on the right side; jelly-like portions of fibrine are found in the ventricles, almost united with the valves, and running into the large arterial vessels. The intestinal canal often contains a more or less bloody fluid, is in patches intensely injected, and here and there are diphtheritic exudations and patches, like those of typhoid, and ulcerations which have led to bleeding; in other cases, the intestinal canal is much less affected. The kidneys are enlarged, and full of blood, the capsule easily separable. The cortical substance is increased in bulk, and of a yellowish pale red colour; the Malpighian corpuscles are usually visible as small red points. The tubular substance is livid near the base of the pyramids. The papillæ are œdematous, and a milky fluid is easily pressed out of them. The pelvis of the kidneys, the ureters, and the bladder usually contain a yellow-brownish flocculent fluid in small quantities. The liver in this stage is found to contain more blood, and the gall-bladder is less distended. The spleen has regained its normal size.

I shall content myself with saying very little about either the diagnosis or the prognosis of the disease.

Usually in the early stage of Cholera, when there is merely preliminary diarrhœa, there is no positive diagnosis. If Cholera is known to be prevailing, diarrhœa must be viewed with suspicion; when the disease has fairly set in, one glance at the countenance is sufficient; it can only be mistaken for

the effects of some acute poisoning, or for common cholera morbus. In the latter case it will lead to no serious mistake of practice ; and, indeed, we have seen that the special characteristics of malignant cholera—rice-water evacuations and suppression of urine—were noticed by the earliest writers, who treated the disease according to its gravity.

Regarding the prognosis, it has been remarked by a very accurate writer, that it can only be positive in very slight and in very bad cases. It is more unfavourable in proportion to the rapidity with which the disease runs its course ; the suddenness of the eollapse both proves the violence of the disease, and prevents our remedies from having time to act. The chance of recovery is usually smallest at the beginning of an epidemic, the few first cases proving almost always fatal.

The well known example of the outbreak at Kurrachee, in Scinde, is a good illustration of this. Of the

First	100	admissions	.	.	.	79	died.
Second	„	„	.	.	.	66	„
Third	„	„	.	.	.	50	„
Fourth	„	„	.	.	.	40	„

The treatment all the time remained essentially the same.

The more slowly a case runs its course, the better the chance of recovery. The restoration of the urinary secretion is the most favourable symptom of all, although even this is not an infallible sign.

CHAPTER VII.

ANALOGIES.

THE symptoms of cholera have often been compared to those of acute poisoning, to violent shocks to the nervous system, to hæmorrhage; and they have even been compared with the effects of leucorrhœa or prolonged lactation. The phenomena of ague, with its collapse and reaction, have often been thought to resemble it. It may perhaps, therefore, aid us in examining the pathology of the disease, if we first take a survey of some of the affections which are considered to have points of resemblance to it.

The following are the leading symptoms of acute hæmorrhage :*—If the hæmorrhage is rapid and abundant, the patients have shiverings, the face and the whole surface of the body get pale or discoloured, the extremities grow cold, a cold and clammy perspiration appears, especially on the forehead and the anterior of the chest; there is a tendency to fainting, the pulse becomes depressed and accelerated; there most frequently succeed efforts at vomiting,

* Description mainly from Burns's Midwifery.

involuntary alvine evacuations, feeling of oppression at the chest, extreme longing for air, throwing about of the limbs, occasionally convulsions, a peculiar delirium, fainting fits, and sometimes coma. If the loss of blood is excessive death may take place in a few minutes, especially if the patient is allowed to quit a recumbent position.

If the hæmorrhage has been very abundant, when the patients come to themselves after fainting, a state of reaction, well described by Marshall Hall, takes place. It is characterized by heat of skin, by the pulse becoming full and hard, at the same time the impulse of the heart is strong, the respiration is frequent, there is thirst, the urine is scanty and red.

Such cases have been treated by opium, stimulants, venesection, injections of cold water, recumbent position.

Anything like identity in the effects of hæmorrhage and of the discharges of cholera cannot be expected, when we consider that the latter do not contain the serum of the blood, as was at one time supposed, but a fluid very poor in solid constituents.

Still some points of analogy are curious: the stage of depression and the stage of reaction; the sudden death apt to occur in either case when the recumbent position is not preserved. It is curious, too, that many of the remedies for uterine hæmorrhage have been employed in the treatment of cholera.

Cholera and hæmorrhage have one fact in common,

however different the cause of it may be, and that is, the sudden diminution in quantity of the bulk of the circulating fluid.

The symptoms of cholera have been again compared to those of an irritant poison; and antimony, of whose effects I have seen examples nearly identical with those of copper poisoning, though they are more depressing, may be taken as a type. Riverius points out the analogy between cholera and the action of irritating poisons and of drastic cathartics—instancing *Elaterium* in particular—long before attention was directed in modern times to the subject. Guided by some special theory, French writers have recently thought the poisoning by oxalic acid to resemble most closely the symptoms of cholera.

The following is an abstract of the symptoms of poisoning by tartar emetic:—Copious vomitings, frequent hiccup, burning heat in the epigastric region, colic, copious stools, syncope, small accelerated pulse, cold skin, but sometimes intense heat, difficult breathing, vertigo, fainting, convulsive motions, very painful cramps of the legs, prostration of strength, and death. Sometimes great difficulty of breathing may be present. The vomitings and alvine excretions do not always take place, and the consequence of this is increased violence of the other symptoms. In one case after death the right side of the heart was found distended with blood.

I shall only remark on these symptoms that some

* Beck's Medical Jurisprudence, ed. 1838, p. 787.

observers have occasionally seen great difficulty of swallowing in cholera ; I have never met with it myself. I may also add, that if there be a homœopathic remedy for cholera, surely antimony is the fittest.

An example of a vegetable irritant is afforded in the effects produced by Croton oil. At the end of three-quarters of an hour after the oil had been swallowed, the skin was cold and covered with cold sweat, the pulse and action of the heart scarcely perceptible, respiration difficult, the points of the toes and fingers, the parts around the eyes and lips blue, as in malignant cholera, but no vomiting. In an hour and a half there were excessive and involuntary alvine evacuations, sensation of burning in the œsophagus, skin colder, respiration and circulation difficult, the cyanosis extended over the whole body, the skin became insensible, and death occurred with some symptoms of asphyxia four hours after the poison was swallowed.

In the latter case of poisoning by a vegetable purgative, the symptoms approach wonderfully close to those of cholera, and are in accordance with C. Schmidt's belief, that cholera evacuations are practically identical with those produced by purgatives ; it is a pity that we do not know the nature of the evacuations in this case, or whether there was any suppression of urine. The watery evacuations of *Elaterium* stools are strongly suggestive of cholera.

* Pereira's *Materia-Medica*, vol. ii. p. 1276.

Dr. Sangbusch thus describes the symptoms resulting from eating putrid fish :*—Feeling of corrugation and dryness in the mouth, violent thirst, nausea and vomiting, abdomen at times spasmodically tense, at others soft ; constipation, or oftener diarrhœa ; strangury, often amounting to retention ; difficulty of swallowing and of respiration ; headache, or swimming of the head ; blueness of the face, dilatation of the pupils, small weak pulse, numbness of points of fingers, coldness of the extremities, marked sinking of the vital powers. If these symptoms increase, death results from suffocation, consciousness remaining complete. In case of recovery, the collapse and characteristic symptoms often suddenly cease. But giddiness, imperfect vision, weakness and hoarseness of the voice, and lassitude, remain longer. Occasionally there is an increase of all the symptoms just before they begin to remit. Sometimes also before complete recovery, swelling of the parotids, with tendency to abscess, takes place, and sometimes erysipelatous swelling of the face.

Such cases, the result of eating crawfish, I have often witnessed in India, and Beck mentions colic, diarrhœa, and cholera morbus immediately prevailing to a great extent after the arrival of a cargo of bad oysters in New York. The parotitis described by Dr. Sangbusch is one of the occasional results of cholera.

The resemblance of an attack of cholera to that of

* Allgemeines Repertorium, 1846.

an aggravated ague fit has suggested itself to many, and a parallel has often been drawn between them. This view was developed with much ingenuity by Dr. C. W. Bell.* But another and more striking analogy is presented in cases of what the French call *fièvre algide*, which are supposed to be dependent on miasma; of this also I have seen some instances. This is the history of *fièvre pernicieuse cholérique* in Algiers, according to Haspel,† and such cases are mentioned by Riverius.

More or less violent rigors open the scene; next come vomiting and dejections, bilious, yellow, or green in colour, pain in the abdomen. The features of the face become, in a few moments, pinched; the eyes hollow, with cavities around them; the voice extinguished; a bluish colour and intense cold occupy the inferior extremities, and spread over the whole body. The tongue, which is large and moist, gets icy cold; at the same time a burning heat is felt in the interior, with ardent thirst; the pulse is small and thread-like, to be felt only at intervals, and soon ceases to be felt at all. The urinary secretion is suppressed, painful cramps attack the calves and the dorso-lumbar region, and extort groans and cries. The patients complain also of cardiacgia, of an inexpressible feeling of suffocation and constriction of the base of the thorax, which seems to prevent the entry of air into the chest, which causes great

* Medical Gazette, 1847-48.

† Maladies de l'Algérie, vol. ii. p. 290.

anxiety and extreme agitation ; constant vomiting and purging come to add to their sufferings. The respiration becomes more embarrassed, gets weak, and is by degrees extinguished. The weakness of the heart gradually increases, and its pulsations become almost imperceptible, a cold perspiration inundates the patient, and he expires asphyxiated, with his consciousness usually remaining complete in the midst of all this perturbation.

When the case does not terminate fatally, reaction suddenly sets in, the pulse begins to return slowly, the skin begins to soften and regain its natural tint. Slow regular movements of the heart commence to be heard, and the respiration becomes freer and deeper ; the face loses its cadaverous colour, the vomiting has disappeared, and the alvine dejections have ceased entirely.

If the reaction passes certain limits, one often sees typhoid symptoms develop themselves.

In a fatal case, the right cavities of the heart were found gorged with coagulated black blood.

Here have we not almost a complete picture of ordinary cholera ? But there are differences. Cholera is not ushered in by rigors, the fluids ejected are yellow, green, or bilious in pernicious fever, in cholera like rice-water ; the face, too, is not so much altered in the fever as in cholera ; and, above all, the specific treatment by quinine is only applicable to a miasmatic fever.

I have met with many cases of fever, suddenly terminating in hopeless collapse. Martin men-

tions the prevalence of a choleraic fever in Calcutta during one season. In his recent report on the great epidemic fever which has of late years devastated Lower Bengal, Dr. Elliott* says he was informed that the cases which were most rapidly fatal varied little in symptoms from cholera. Unfortunately he did not see any of them. But Surgeon R. H. Perkins tells me that he has often known fever in the Hidgelee district commence like cholera, so that the diagnosis might at first be uncertain.

Following these analogies, if we were to assume, with some, that cholera and tropical fever are both the result of a vegetable miasma, yet much will remain to be explained. Granting the similarity of some of their forms, how should the manifestations of the poison be so very different as are the phenomena of an ordinary attack of sharp remittent fever and an ordinary attack of cholera?

Sometimes, especially during cholera epidemics, cases of dysentery are seized with sudden collapse, and it is difficult to determine to which disease the fatal result is to be ascribed. Such cases I have met with, but chiefly in hospitals. Some resemblances have been pointed out between the state of the mucous membrane of the intestines in both the earlier and later stages of cholera and of dysentery.

Further analogies have been suggested, to which I can only allude. Dr. Buhl is of opinion that the effects of extensive burns, producing often excessive agita-

* Op. cit.

tion and restlessness, and attended with a remarkable difficulty of breathing, and sometimes with nausea and vomiting, resemble greatly those of cholera; others have seen a certain analogy in the effects of intussusception. Various Indian officers—among them Kennedy and Orton—have compared the effects of sudden injuries, such as blows on the head and snake bites, to those of cholera; but the resemblance is chiefly between them and the more acute and sudden forms of the disease.

Notwithstanding the obvious similarity of symptoms in many of the above affections, the tendency of medical theory now, in carrying out the idea of a blood poison to be eliminated, is to assimilate it to a class of diseases from which, at first sight, it differs most widely. In its nature it is said to be probably most akin to measles, typhus, scarlet fever, and croup. They all show in their exudative period, like cholera, though in a much smaller degree, a certain amount of thickening of the blood, with lessened secretion, and, in some instances, with alterations in the kidneys; and in some of these there is the same tendency to shedding epithelial scales.

We have already pointed out that the laws of the diffusion and prevalence of small-pox are considerably different from those of cholera in Lower Bengal.

Strange it is, if the diseases be allied, that the onset of their attacks is attended with fever, while that of cholera is attended with the absence of it, or with actual depression; but scarcely stranger than the fact that congestion of the capillaries is in them

attended by heat and inflammation, while in cholera it is followed by cold and lowered vitality. The course of the disease also, is far longer in the eruptive fevers than in cholera.

The ultimate reason why poisons like scarlatina and small-pox should eliminate themselves mainly through the skin, cholera through the mucous membrane of the intestines ; why the poisons of dysentery and of typhus should affect the intestinal canal so very differently from cholera, are points on which a deep obscurity rests.

The secondary stage of cholera in some of its forms, with its exanthema, does really come very near typhoid fever.

On reviewing the analogies that have been thus presented to us, one can scarcely resist the conclusion that the general analogies of cholera are much more with acute poisonings and hæmorrhages, and with the malarious, rather than with the eruptive type of fevers.

It might be possible to mistake the collapse of *fièvre algide* for that of cholera, and the secondary form of cholera for typhus, but it would be impossible to confound any stage of the disease with one of the eruptive fevers ; yet the generally assumed similarity in nature of cholera and that class of blood diseases must not be wholly overlooked.

CHAPTER VIII.

SKETCH OF OPINIONS ON ITS PATHOLOGY.

THOUGH medical opinion has varied a good deal respecting the pathology of cholera, there has been a very obvious reason for this. The great difficulty is to find an explanation that suits equally well its more ordinary and gradual form, and the less common and more rapid form in which collapse seems to set in from the very beginning. In the first class of cases, the immense watery evacuations attracted chief observation; in the second, the rapid onset was chiefly noticed, and suggested the idea of a deep sudden impression on the nervous or on the circulatory system. A detailed history of opinions on these subjects might be by no means uninteresting, but I must limit myself to a sketch of them at one or two periods.

The earliest notion of all concerning cholera, as it manifested itself in those days—the idea which runs through Hindoo, Greek, and Arabian medicine, and which descended to Riverius and Sydenham—was that the system was endeavouring to free itself of a poison—of something noxious—usually introduced through the medium of food.

Descending to more modern opinions, we find

Mr. Jameson, in his Report of 1820, writing thus :—"It may be conjectured that the stomach and small intestines are the primary seat of the morbid action in this disease. That this is the case might have been supposed from the analogy of its symptoms with those caused by violent lesions of those parts from the introduction of mineral and other poisons, and is proved by the whole history of the attack. The stomach, almost without exception, is the organ first affected. The patient complains of soreness, constriction, and pain at the epigastrium; he feels sick and faint, and then he vomits and purges. All this is previous in time to the sinking of the pulse and coldness of the extreme parts, and in most cases to the spasms. To his stomach the patient invariably refers the intolerable anguish and burning heat by which he is tormented. Irritability of stomach is the most obstinate part of the disease, and keeps up long after other symptoms have disappeared. * * * That the depressed state of the circulatory power, and diminished action of the heart and arteries, were rather a consequence and symptom of the severe shock which the system had received in one of its principal organs, than a primary affection, was rendered probable by their being subsequent in appearance to the vomiting and purging, by their gradually increasing with the aggravation of those symptoms, and by their total absence in some cases for several hours after the other symptoms of the disease had reached their highest.

“ This, too, was proved by no diseased appearances being discoverable in the heart and lungs, except the distension of the large vessels, an effect of the accumulation of blood. Besides, supposing the suspended state of the circulation to be the cause of the disease, the cause assigned is insufficient to explain the effects attributed to it. * * * Nor can the disorder be attributed to spasm of the extreme vessels, for in ague there is the same want of arterial action; so that in the burning heat and great internal tumult of this disease the capillary vessels are rather in a state of atony than of spasm.” * * *

These views are interesting, as having been formed before the necessary effect of the altered blood on the circulation had attracted attention. Mr. Jameson was thus, in 1820, trying to solve the phenomena of the disease; and in the previous year, the Medical Board of Bombay had written, “ that cholera resembled the effects of a poison taken into the stomach, or applied to the blood, but whether it acted more immediately on the circulatory system or on the nerves, they could not determine.”

The old idea of a blood poison was early revived in India, and the vomiting and purging were looked on merely as an effort of nature to eliminate the poison from the blood. Kennedy, in 1827, and others, while accepting this view, looked on the disease as being originally the result of a great shock to the nervous system, or to the great sympathetic.

When the disease reached Europe, Magendie

attributed it to a weakened power of contraction of the heart, Ockel to a paralysis of the circulation. Delpech placed its seat in the great sympathetic, Dr. Foy in the spinal column; while, according to Broussais and his school, the disease was necessarily an inflammatory affection of the intestinal canal. Perhaps Rochoux took the most philosophical view of the case, when he wrote that cholera depended on an alteration of the blood by a deleterious agent, which appears to act specially on the nerves of circulation and respiration, and on the mucous membrane of the intestines.

It seems to have been about this time that the phenomena connected with the change in the condition of the blood, and its defective aëration (noticed, indeed, by Davy, in Ceylon, many years before), attracted particular attention, and became the subject of careful study.

After the first visit of cholera to Europe, in 1832, the following appears to have been the ordinary theory of the disease :*—

The most characteristic symptom of cholera without doubt is the immense evacuation of fluids from the alimentary canal. This liquid was supposed to be analogous to the serum of the blood; and whether it was or was not so, it was easy to see how the blood, deprived of its water, circulates badly and ends in stagnating, not only in the capillaries, but by degrees in the large vascular trunks: thence

* See Dictionnaire des Dictionnaires ; article, Cholera.

the eutaneous cyanosis. To repair the loss of fluids by the blood, there is a general imbibition from all the tissues and structures, which end in draining themselves; the result of which is a rapid shrinking of the parts observed, especially in the fingers, nose, and about the eyes. Absorption, and the functions of the secreting organs, are suspended from the want of water, which is indicated by the intense thirst of the patients, and their demands for water. The pulmonary capillaries no longer admit a blood that has become too thick to circulate easily in them: hence their bloodless state; hence also the black colour of the arterial blood, which has not been aerated, the expired air containing more than the usual amount of oxygen, which was therefore not absorbed and converted into carbonic acid, as under ordinary circumstances. (Davy, Rayer, Twining.) The imperfect aëration of the blood explained the defective calorification and the cold that resulted from it. The absence of blood from the lungs and the imperfect aëration, accounted for the feeling of suffocation in the more advanced stages, and the feebleness of the voice was probably caused by the weakness of the respiratory organs, which are not able to pass into the larynx a column of air strong enough to produce the natural voice.

This theory contains the essentials of all views that have hitherto been entertained of the effects of blood changes in the disease, although some additions to our knowledge have been made.

Twining, 1832-5, saw reasons for concluding

that the decarbonizing power of the lungs is affected to a great degree.

The non-secretion of bile and urine was commonly attributed to non-oxygenation of that fluid.

Other theories of tolerably early date, making the suppression of bile a fact of primary importance, which were pretty generally spread, scarcely need a notice.

The suppression of urine did not in these early days attract very much attention.

It has become known that the flocculi of the rice-water stools consist of mucus and epithelial cells; the last were first observed by Boehm of Berlin, in 1837. They are seldom perfect: often a sort of detritus of scales. The fluid of the stools has been found to be essentially water, only from one to two per cent. of solid matter being present; this is chiefly inorganic—mainly chloride of sodium with a little carbonate of ammonia and phosphate of soda. These fluids are by many believed to contain the cholera poison, which may be propagated by them under certain conditions, although all attempts at inoculation with them have, up to the present date, given negative results.

The blood is found to have a corresponding loss of water and chloride of sodium, with slight increase of its other inorganic constituents. But even now its condition in various stages of the disease is not very exactly known.

At the time of the first visit of cholera to Edinburgh Dr. Mackintosh had observed that dense fibrous clots were frequently found in the right side

of the heart, extending into the branches of the pulmonie artery, and "it appeared to all who witnessed the examinations, that these plugs were formed during the progress of the stage of collapse, and not after death." In 1849, Gluge observed such elots. In 1847, Dr. C. W. Bell expressed the opinion that all the phenomena of cholera are the mcchanical effects of congestion, caused by too much blood being driven on the right side of the heart. Dr. Parkes, in 1847, struck by the want of blood on the left side, and its aecumulation on the right, and by its arrest in the pulmonic arterics, looked for the cause of the arrest of the circulation in the blood itself.

Buhl, 1854, makes the disease manifest itself in the capillaries of the intestinal canal and skin first. A proof of this is the early cyanosis of the skin, which constantly precedes impaired respiration. Like Parkes, he attributes the exudation from the bowels to the slow circulation and congestion of the capillaries; he ascribes a great deal to the cessation of the disintegration and renewal of tissue; he believes that the disintegration of tissue goes on at first, but its products seem to cease to be eliminated, and lie where they are formed; the kidneys do not cease to act from any insufficiency, but because there is an entire cessation throughout the system of the disintegration of tissue. The cyanosis of the skin does not result from an obstruction of the general circulation, but is produced directly, like all the other phenomena, by interrupted renewal of tissue and impeded peripheral capillary circulation. The

defective calorification he ascribes, like others, to the inactivity of the capillary circulation near the heart. But Buhl does not overlook other causes of the greatly retarded capillary circulation, which are to be found in a lessened power of the muscles of the heart and in atony of the arteries.

Dr. Gull* thought that an important lesion of circulation had taken place in the intestines, and suggested a sympathy of the heart with it, and the idea of a specific poison acting upon the ganglionic nervous centres, or upon the mucous membrane of the intestines. This view of altered innervation seems, according to Mesner, to be the popular one in France at the present day.

Griesinger,† not entirely satisfied with the thickening of the blood theory as a complete solution of the oppressed circulation, adds to it weakness of the muscles of the heart, the presumed, though unproved effect of the coldness of the blood from the surface retarding the circulation, and also thinks there must be some direct sympathy between the bowels and the heart, as in the case of strangulated hernia or of irritative poisons. He observes that the distension of the right side of the heart with blood found after death is not proved by any physical signs to exist during life.

About the same time, adverting to the accumulation of blood on the right side of the heart, Dr. G. Johnson,‡ as the French would say, ac-

* Report to College of Physicians. † Virchow's Handbuch, 1857.

‡ Epidemic Diarrhoea and Cholera, 1855.

centuated previous views of this phenomenon by making the first step of collapse consist in a spasm of the muscular coat of the pulmonic artery, excited by the application of a poison in the blood, and drew the inference from it that imperfect pulmonic circulation and defective aëration of the blood are primary, not secondary, affections in cholera. These views Dr. Johnson has supported with much ingenuity, and has given a chemical explanation, which I believe is novel, of one point, the anomalous fact that in some cases of cholera the secretion of milk in women nursing seems to have gone on partially, although usually the function is impaired.

On these views, as being among the most recently put forth, and as bearing on many most interesting points, I shall venture to make a few remarks, after premising that—

We seem warranted in inferring generally that the cholera poison, whatever it may be, operates so as to make the capillaries of the intestines, part with their fluid contents, and so as to prevent the entrance of a due supply of blood to those of the lungs. These very different effects are probably the result of congestion of blood-vessels in one case, and possibly of spasm of them in the other, in either case, no doubt, attended with altered local innervation.

I am not aware that any author in describing the symptoms of the disease has commenced with obstruction of the circulation and respiration. I have looked

over many accounts, but the Latin translation of D'Orta, at Antwerp, 1570, is the only one which commences with "*Pulsus languidus et concisus, difficilis respiratio.*" It has not been placed first by authors, because it has not been observed first. It is, indeed, quite doubtful whether the distension of the right side of the heart has ever been recognised to exist during life.

It has always been admitted that the circulation is affected sooner or later in cholera; the only question is, how early? In a case of cholera which runs its course uninterruptedly, obstruction of the pulmonary circulation, with defective aëration of the blood, always occurs; but what proof is there that they are primary? It may be granted that it is possible that spasm of the pulmonic artery may be the first step in cholera of extreme malignity; but that it is the first step in ordinary cholera we shall see is not probable. We must bear in mind that the pathology of a disease, though not disregarding exceptional cases, should explain its ordinary phenomena.

Cases of choleraic diarrhœa are accepted by many as true cholera, and said to be capable of spreading the disease. In such cases there is surely no obstruction of the pulmonic artery, or palpable affection of the respiration.

In the immense majority of cases the transudation from the alimentary canal as shown by diarrhœa and vomiting, precedes collapse, and when it does not, the case is exceptional. Even in cases of the

so-called cholera sieca, choleraic fluid has always been discovered in the intestines.

If, then, it be conceded that the transudation from the alimentary canal is preceded by retarded capillary circulation, it is quite certain that, in the vast majority of cases, this retardation precedes any spasm of the pulmonary artery. Further: oppressed circulation has sometimes been absent for several hours after the other signs of the disease have been fully established, as was observed long ago by Mr. Jameson; and the characteristic coldness of the disease is sometimes observed with the pulse still tolerable, and therefore before the circulation has been very deeply affected.

On the other hand it is argued, and must be admitted, that the degree of collapse bears no certain proportion to the amount of the discharges. This is, I think—although I could easily quote opinions contrary to it—beyond all doubt.

Two other arguments are advanced—first, that the state of the blood bears no relation whatever to the loss of fluid; my own experience in bleeding in various stages of cholera goes against this, and accords with the common opinion of authors, that at the beginning of an attack blood flows freely on venesection.

It has also been said, that collapse passes off while purging continues; and as a corollary to this, that the blood again becomes thinner without any fresh source of moisture. Here I must join issue. Every

observer has recorded that the gradual subsidence of vomiting and purging is the dawn of recovery, and accompanies the stage of reaction. If the case relapses, it is usually from fresh active purging. In reaction, says Griesinger,* the evacuations either cease entirely or become infrequent. And in this I believe that all who have studied the disease will agree with me—that, as the usual rule, when the evacuations do continue, they are much smaller in quantity—being probably the remains of what had been effused into the intestine at an earlier period—and of more consistence; the immense discharge of fluid has ceased.

As for sources of moisture for the blood, the lungs begin again to absorb moisture from the atmosphere. The patient has usually water to drink, part of which becomes absorbed, and in the absence of such supplies it is quite possible that the watery portion of the exudation into the alimentary canal is taken up again, which the gradual thickening of the evacuations, or the cessation of them, would tend rather to show. Besides, it has been observed that during the whole stage of reaction the amount of water in the blood is below the normal standard.

It may be also remarked that any exclusive view of the disease attacking the pulmonic circulation at once is one-sided; that if the other theory lays too much stress on the altered condition of the blood,

* Op. cit.

in the positive facts of its being thicker and colder, and loaded with débris, the first scarcely allows these important conditions any place at all in its explanation of the disease.

Although physiological and chemical explanations of absolutely accepted facts are of much interest and of great importance in advancing medical knowledge, they must be received with caution, when we consider how constantly our views on such subjects are modified by the advance of science.

As for arguments drawn from the results of medical treatment, there is so much uncertainty in them, and they may be so variously interpreted, that I shall only allude to them incidentally under the head of treatment.

Finally, this theory does not in reality explain the causation of the disease, for while it only gives an hypothesis for the blood-poison attacking the right side of the heart, it affords no explanation of the immense drain from the alimentary canal, or the supposed elimination of the poison through this channel.

A theory that is to meet all the circumstances of the different forms of cholera, like one to meet all the phenomena of its diffusion, must be a very extensible one. Meanwhile, till one is found, it may be suggested, that the cholera poison, according to the quantity and the intensity of its dose, and according to the condition of its recipient, may either, as it usually does, attack the pulmonie circulation more slowly through the capillaries of the alimentary canal and the general periphery, or as it

does more rarely, directly by causing obstruction of the pulmonic artery.

Anything that can be said as to the mode of action of the poison on the nervous system is even more indefinite.

We are after all brought back very much to the views of Rochoux and the Bombay Medical Board. We do not doubt the existence of a blood-poison, but as we do not know its nature (very possibly it may be a ferment, some nitrogenous organized body), so we cannot yet talk with precision of its *modus operandi*; and the assumption that there is a poison present does not necessarily tie us down to accepting only one method of its operation, nor to regard vomiting and purging necessarily as efforts of nature to eliminate a poison.

In this account of the pathology of the disease, I have not entered into any explanation of the secondary phenomena of cholera. I shall only say that they appear to be the effects, not of any blood-poison, but of the immense derangements of the system caused by the preceding attack.

TREATMENT.

CHAPTER IX.

THEORIES OF TREATMENT.

Nec ratio remedi communis certa dabatur.—LUCRET.

IN entering on the consideration of the treatment of cholera, various preliminary questions suggest themselves. Even if we could ascertain with absolute accuracy where the diseased train of action commences, should we be able to act directly on that knowledge? How far are our theoretical views of the nature of the disease applicable to practice?

One might be inclined to say, give opiates or astringents to check the excessive evacuations—give stimulants to maintain a failing heart, antispasmodics or opiates to counteract spasms of arteries or of muscles. Try to support the nervous system in the great shock which the sympathetic or spinal nerves have sustained; manage to aërate the blood, supply its lost water and salts to the circulating fluid by diluents, restore heat by applications to the cold surfaces, excite the secretion of bile or of urine. All this has been attempted.

But supposing that we could attain one or all of these ends, should we be carrying out the great idea of modern practice, the elimination of a supposed poison from the blood. I call it of modern practice,

but it is in reality of the greatest antiquity. The idea of there being something in the blood to be got rid of, appears in the oldest Hindoo writings, runs through the practice of the Greek and Arab writers, and re-appears in the works of Riverius and Sydenham, Willis,* who was nearly their cotemporary, appearing to be the first who protested against the evacuating treatment founded on this notion.

From this date two opposite views of the treatment of cholera come constantly before us, one based on the idea that the disease may be advantageously acted on by endeavouring to diminish the amount of exudation, the other on the notion that the system requires help to enable it to eliminate a poison from the blood. These two conflicting modes of treatment have been illustrated by the differences of opinion that have prevailed in late years respecting the appropriate treatment of typhoid, as in former times respecting that of ague.

But the view that the evacuations of cholera must be looked on as the equivalent of the eruption in small-pox or scarlatina, or the diarrhœa of typhoid, is so commonly entertained that it must be more particularly alluded to. On this theory it is supposed that the treatment of those diseases must be suitable for the treatment of cholera. What then is their treatment? It is usually considered eliminant, and consists in gentle aperients, acting on the skin by diaphoretics; in short, it attempts very little interference with the course of the disease. It

* Thomæ Willis, *Pharmaceuticæ*, sect. iii. cap. 3.

can scarcely be called evacuant, and indeed in typhoid many advocate the use of astringents.

Now, in a disease running so rapid a course as cholera does, what could one expect from such a line of treatment in its onset? At best, could it be more than merely harmless; and at a more advanced stage, when absorption is so deeply impaired, what chance could there be of any effect resulting from the use of such mild remedies? Is, indeed, elimination usually so defective in cholera that it needs encouragement? No; in the vast majority of cases it is only too abundant, and assuredly debilitating. If, again, the eliminating treatment is more active, and such as could be called evacuant, then if the medicines were given early enough to be absorbed, the presumption of all past experience is that they would be hurtful; but more will be said on this head, of evacuation when it amounts to violent emesis or purgation, when we come to speak of the different classes of remedies. There is, indeed, one stage of cholera for which mild eliminating treatment is adapted, and that is when the system tries to rally from the immense shock it has undergone, and has to struggle through secondary fever.

Further, one might remark that it is not the object of ordinary eliminatory treatment to increase the intensity of an exudation. It is no object to produce a very copious eruption in small-pox, or diarrhœa in typhoid. On the contrary, too extensive an eruption is often fatal in small-pox, and one of the objects kept in view in treating typhoid is to moderate the diarrhœa; then why should we endea-

vour to increase the evacuations in a disease supposed to be kindred? The analogy of eruptive diseases, therefore, offers no encouragement to the use of the evacuant method in cholera.

I think, too, that on the whole, secondary fever is commonest in cases of cholera where the discharges have been most frequent and longest continued. If this be a fact, it would be an additional argument against the use of remedies calculated to protract them.

A general question of much interest next arises for consideration. Is it possible to cut short a blood disease, or must it run its natural course? In the ordinary eruptive fevers I think it must be granted that we cannot.

No one believes that he can cut short small-pox or scarlet fever, although that does not prevent our making every effort to moderate their course. As to typhoid, it is nearly as certain. Dr. Hughes Bennett,* indeed, seems to think that continued fever may sometimes be averted by emetics, and Dr. Dundas by quinine.

But however that may be, and setting aside the case of dysentery, a disease usually supposed to be dependent on a blood-poison, which certainly can be checked in the onset, we have the greatest glory of therapeutics, the cutting short of malarious fever, another blood disease, with a certainty that is quite marvellous. Nor is the fact the less doubtful, although its employment is simply empirical, and

* Clinical Lectures, 1859, p. 926.

to this day there is no theory of the action of quinine that explains its operation satisfactorily.

It is therefore just possible that we might find a medicine that cut cholera short, and we should be obliged to use it, whether or not we understood the philosophy of its operation. It was at one time hoped that quinine would serve such a purpose, but that hope has long been given up, and the doctrine of specifics being found for different diseases is not widely entertained in these days.

We have, however, from the first outbreak of the disease, used a medicine which has a marked power of arresting the disease, probably mainly by checking the transudation; and whether theoretically it be correct to arrest them or not, we know that practically if the vomiting and purging can be stopped early in cholera, the disease is stopped and the patient saved. It is curious, indeed, to see Sydenham and other early writers, though they theoretically recommended emetics, all agreeing if the case was violent, to move on to antagonistic remedies.

The next point on which a few words may be said is the question how far the exhibition of medicines, if failing to arrest the disease, increases the collapse, and how far the secondary fever of cholera is a natural process or the result of treatment. The affirmative view on this last point is held by many men of eminence and experience, among whom is my friend Dr. W. Maclean;* and here,

* Lancet, 1866.

at the risk of being considered tedious, I shall enumerate certain leading facts about the disease without adducing detailed proof of them.

Recovery from cholera has occurred under all treatments, and under no treatment. So also has secondary fever.

In cholera there is an immense and sudden escape of watery fluid. There is diminution of the bulk of the circulating fluid, which becomes thicker. There is retarded capillary circulation everywhere, and at one stage obstruction of the pulmonic circulation. There is greatly diminished absorption. There is imperfect aëration of the blood, and diminished calorification. In the early stage of collapse the secretion of bile and of urine ceases. If the case is not fatal, there is more or less gradual restoration of the normal condition—sometimes rapid, most frequently slow, and often very tardy—with diarrhœa and irritability of stomach, and secondary fever, of what is called a typhoid character, connected with uræmia.

Now with respect to the question of the action of medicines at all after the early stage, it is necessary to view still more closely the condition of the system with reference to absorption, when the disease has once begun to run into collapse.

In this stage, it is the opinion of all authors that the function of absorption is greatly interfered with. The stomach and the intestines are supposed to retain, at most, about one-fifth of their power of absorption, the rectum probably retaining most power. When the capillary circulation is at a standstill, and the alimentary canal seems bent on passing

upwards or downwards everything that is presented to it, there would appear to be little chance of fluid, and none of solid medicines being absorbed. Experiments—which, indeed, leave much to be desired—appear to show that strychnia and belladonna, administered through the alimentary canal during collapse, do not operate at all; whereas belladonna, injected into the blood, produces dilatation of the pupil; also that medicines which are readily absorbed, such as iodide and ferrocyanate of potass, given by the mouth early, and still more during collapse, are seldom to be found in the blood or in the urine.

The following facts, gathered from various writers on cholera, show well how completely absorption must be at a standstill. The late Dr. K. Mackinnon* records that an old native soldier swallowed twenty-seven grains of opium and forty-five drops of croton oil in the course of twelve hours, after a state of intense collapse had come on. There was no stupefaction, and the purging ceased, though the patient had afterwards to struggle through an attack of gastro-enteritis. In another case, where the collapse was not so great, a native swallowed in pills thirty-three grains of opium and fifty-five drops of croton oil, and recovered without a bad symptom, or the oil having any purgative effect. In a case of cholera algida cyanica, with asphyxia, Duchaussoy† introduced twenty-two grains of extract of belladonna into the stomach and rectum in thirty hours. There was no dilatation of

* Prevailing Diseases of Bengal, 1848.

† Gazette Hebdomad., 1854.

the pupils; frietions in the axilla with pomade of belladonna five hours before death produced no effect. One patient, says Dr. G. Johnson,* took no less than thirty-three ounces of castor oil, of which probably less than a sixth part passed into the intestines. Dr. Ayre once gave 580 grains of calomel in three days, and this was followed by no ptyalism or disagreeable effect. It would be easy to multiply examples of this kind, but I shall merely add the strongly-expressed testimony of the late Mr. Moore of the Bengal army :†—" Could quantity have added to its value, I have prescribed scruple after scruple of calomel, or combined with one and two grain doses of opium. I have seen one and both prescribed by others, in more heroic doses than I have ventured to give, until the patients had swallowed as much calomel as would have, under ordinary circumstances, salivated a troop of dragoons, and as much opium in powder and tincture as would have stupefied a company of infantry. Yet the patients neither slept, nor did they even exhibit the slightest approach to salivation."

But perhaps the fact of the non-operation of medicine during collapse is taught most instructively by the statistics of Dr. Griffin, from the Limerick hospitals,‡ showing the effect of treatment as applied during the absorbing or non-absorbing stage of the disease. I do not of course overlook the fact that

* *Op. cit.*† *Medical Gazette*, vol. x. 1850.‡ *Medical Gazette*, vol. xxi. 1838.

non-absorption is only one of the phenomena of the stage of collapse.

823 cases were treated in the primary
stage, with 55 deaths.
625 cases were treated in collapse, with 481 „

With such facts before us, we are warranted in believing that there is little chance of medicines administered during the stage of collapse being absorbed; and I think also in supposing that in cholera, the system, when any absorption does go on, has much the same tolerance of large doses of remedies as in the case where it has received any violent shock, as from intus-susception or extensive burns.

On the whole, it seems evident that undue importance has been attached to the operation of medicines in the stage of collapse.

But then there is some reason to believe that absorption becomes particularly active whenever reaction commences, that a certain quantity of medicines must be retained in the intestines, that they will now produce their specific effects with cumulative power, and that they may also occasion the consecutive fever which often follows reaction. Absolute depôts of pills have been found after death, though more usually they seem to pass through the alimentary canal unaltered.

On these points, and on the dread of medicines given during collapse increasing its degree, I have looked for distinct and positive evidence, but without

much success. I shall therefore briefly give my own experience respecting the chance of medicines having a cumulative action or producing fever.

Salivation no doubt does occasionally occur, when calomel has been used in cholera. Still I have found it by no means common; administered during collapse, calomel is much less likely to cause it, than given after it. Bilious vomiting and green stools occur in cases where not a grain of mercury has been given. I have had occasion to give acetate of lead in very large doses, but have never had any reason to suppose that it afterwards had any specific action; nor has it happened to me ever to have been able to attribute the drowsiness of some stages of the disease to the administration of opium.

In the same way, in administering medicines during collapse I have too often seen how fruitless my efforts to help were, but have rarely had reason to suspect that I had aggravated the collapse of my patient. Authors like Twining, who took no limited view of the disease, thought that they could arrest the progress of collapse by remedies, and did not fail to use them from the dread of increasing it.

With respect to the chance of our remedies inducing secondary fever, I have over and over again seen it occur, when neither opium nor stimulants had been given. In one very remarkable instance of cholera, of a low form, opiates or stimulants were scarcely exhibited at all; the case ran into protracted typhoid fever, and at the end of a fortnight ended in acute mania and death. Dr. Mudge, of Madras, has re-

cently published his treatment of natives with small doses of turpentine only, and in many cases there was secondary fever. Under the cold-water system, cases of secondary fever have frequently occurred. Earlier authors generally regarded the secondary fever as a part of the ordinary course of the disease when it was severe; and it is chiefly within the last twenty years that its occurrence has been ascribed to the administration of particular remedies.

Gricsinger, who is a very impartial writer, thus sums up:—"It is surprising how, in certain epidemics and at certain times, secondary fever is more or less common. Crowding of the sick and overstimulation may, perhaps, contribute to this; but, on the whole, the probability of typhoid is proportionate to the severity of the attack."

Morehead thinks it proportionate to the length of the period of collapse.*

Some, like Dr. Ayre† with calomel, have fancied they could ward off secondary fever by particular remedies; but I need not enter on this question.

I hope we are warranted in drawing the conclusion, that if we knew of any remedy that would arrest the course of the disease, we must not reject its use from a dread of its secondary effects.

* Clinical Researches, Diseases of India, 1860.

† Lancet, 1848.

CHAPTER X.

GENERAL SKETCH OF VARIOUS REMEDIES.

BEFORE entering on the examination of a few of the modes of treatment that have been adopted in the management of Cholera, I would remark that its average treatment has been wonderfully uniform. Just as the disease is exactly the same now as it was in 1817, and a perusal of any of the original Indian reports is, on this point, quite convincing, so has the average treatment remained much the same. The remedies first used in Bengal were laudanum, calomel, brandy, diffusible stimulants, blood-letting, external applications, frictions, hot baths, calomel and opium; in the latter stage purgatives; and most of these remedies, with the exception of venesection, maintain their place to this day in India, as in other parts of the world.

The treatment of the late epidemic in France shows this very plainly for Europe; not that every variety of medicine has not been tried in every country. Recent events show that some remarks I wrote on this subject in 1853, are just as applicable now as when first penned, so I have repeated them.*

* Indian Annals, vol. i.

Within the last fourteen years in India saline enemata, the successors of saline injections into the veins, have had their day. Croton oil and opium pills were at one time pronounced to be nearly infallible. Blood-letting I used to see largely employed, it is now almost quite abandoned. A Madras surgeon found carbonate of soda wonderfully efficacious, as if to counteract the acid of the Austrian cure. Ether and chloroform inhalations were immediately seized on, not merely to relax the spasms but to cure the disease. One surgeon revived the old but forgotten practice of parboiling patients, and lived to abandon it in a few years. The wet sheet, whether dipped in plain water in Bombay, or in an acid solution in Bengal, was for a time found surprisingly efficacious. Quinine was recommended to the public as a remedy, and instantly loads of cures by it were reported in the newspapers. A medical man begged me to give some pills of his a trial; they were found as efficacious as other pills in the state of collapse, and it turned out that they consisted of ox gall. My friend looking on the absence of bile from the evacuations as the cause of cholera, had sagaciously considered that a supply of bile must be its cure. Nitrate of silver has been recommended here as in France, and may deserve a further trial. In Europe a physician of such intelligence as Dr. Graves has brought forward acetate of lead and opium pills as an almost certain cure. Dr. Billing has expected everything from our common Indian fever mixture with the addition of a little quinine.

The population of Paris, under the auspices of Raspail, was crazy about camphor, not only as a prophylactic, but as a sure remedy for cholera. In short we have had ample illustration of the correctness of Bouchardat's melancholy summary in his *Annuaire de Thérapeutique* for 1850. "Le choléra qui nous a si cruellement éprouvé pendant l'année qui vient de s'écouler, a été l'occasion d'une foule de tentatives thérapeutiques. J'étais sur ce funeste champ de bataille où autour de moi j'ai vu tomber bien des victimes sans voir en resurgir je ne dirai pas le remède efficace mais même une découverte, une pensée scientifique et progressive."

India has followed in the wake of Europe in the treatment of disease in general, and has, as I think without any permanent change in the character of tropical disease, but rather changing its practice with altered views of pathology, adopted a less lowering method of treatment, and in most diseases with great advantage. Indian practitioners have not, however, with the exception of giving up general blood-letting, applied the supporting method in any increased degree to the treatment of cholera, and my impression is that Calcutta practitioners of late years have not erred on the side of the too free use of narcotics or stimulants, the dread of the production of secondary fever having constantly acted on them as a caution.

That there is much truth in Bouchardat's observation, and that many modes of treatment have been

applied without much discrimination, few as calmly and philosophically as might have been desired, is not astonishing in the case of a disease like cholera, which is said to commence with death. More especially when we consider with this rapidity of the disease, how difficult it must be in the rush of patients to hospital during an epidemic, to discriminate exactly the stage and consequently the appropriate treatment of each case; or in private practice how hard it is to avoid, if it be only for the satisfaction of the friends of the patient, the appearance at least of adopting some decided line of treatment, although the real state of things may be such as to render the exhibition of three grains of bezoar, with water in which gold has been extinguished, in which García had such faith, or of the billionth of a grain of bread pill, as effective as the exhibition of any drugs.

Another difficulty in the study of the actions of medicines in cholera is, that many practitioners have but few opportunities of studying the disease, and thus give undue prominence to the symptoms they may have observed in their own few cases. It requires long experience and much judgment on the part of a physician to say how far watery purging, increased collapse, green vomiting, and diarrhoea, or stupor, which may succeed their administration, are really attributable to the use of purgatives, stimulants, cholagogues, or narcotics, seeing that all these phenomena occur under any or under no mode of treatment. In medicine we are like our patients, very apt

to exaggerate the effects produced by our remedies, but we do not err in this direction now so widely as formerly.

In spite, however, of the necessary imperfection of many of our observations, there is much to be learnt from the history of past modes of treatment, but in a sketch like this only a few of the principal ones can be examined.

The following table, although its classification may be open to exception, will at least serve to show the indications for which such an immense variety of remedies has been employed in cholera. In this as in many other diseases the mode of practice has often originally been purely empirical, and a theory of its operation has afterwards been formed. This table will save us from the dreary task of examining many of these remedies in detail.

<i>To check vomiting and purging.</i>	OPIATES.—Opium, morphia, haschisch, chlorodyne, belladonna, morphia by subcutaneous injection.
	ASTRINGENTS.—Acetate of lead, nitrate of silver, sulphate of copper, sulphuric, nitric acid, rhatany, catechu, &c.
	CARMINATIVES need not be specially mentioned—chlorodyne.
	ABSORBENTS.—Antacids, soda, magnesia, bismuth.
	SEDATIVES.—Hydrocyanic acid, chloroform, effervescing draughts, iced water, ice—external application of ice—sinapisms, cautery to the epigastrium, large doses of calomel or ipecacuanha, creasote, naphtha.
<i>To favour Dis- charges.</i>	EMETICS.—Table salt, mustard, ipecacuanha, tartar emetic.
	PURGATIVES.—Sulphate of magnesia, calomel, colocynth, croton and castor oil.
	CHOLAGOGUES.—Calomel, emetics.
	DIURETICS.—Turpentine, nitric ether, nitrate of potass.

<i>To Stimulate or support the system.</i>	{	STIMULANTS. — Brandy, wine, champagne, beer, turpentine, cantharides, camphor, assafoetida, pepper, capsicum, musk.
		DIFFUSIBLE STIMULANTS. — Ether, ammonia, its carbonate, valerianate, and succinate.
		AROMATICS. — Ginger tea, peppermint, coffee, &c.
<i>To Relieve Cramps.</i>	{	INTERNALLY. — Chloroform and ether, cajaputee oil.
		EXTERNALLY. — Frictions, rubefacients, ligatures.
		CONSTITUTIONAL. — Blood-letting.
<i>To act on nervous system, colic axis or spinal cord.</i>	{	BY EMETICS. —
		BY NERVINES. — Strychnia, phosphorus, belladonna, nicotine, atropine, by subcutaneous injection, tobacco.
		BY GALVANISM. —
		APPLICATIONS TO SPINE. — Blisters, acids, cautery, ice bags.
<i>To act on the circulation.</i>	{	HEART AND LARGE VESSELS. — Blood-letting, tourniquets, emetics.
		CAPILLARIES. — Leeching, rubefacients, applications of hot or cold water, of ice, hot air, subcutaneous injections.
		CONSTITUTION OF BLOOD. — Draughts of water or salines, chlorate of potass, injections into the veins, inhalations of aqueous or medicated vapours, subcutaneous injection of chlorate of potass.
		AERATION. — Inhalation of oxygen, ozone, chlorine, iodine.
<i>Treating it as</i>	{	Quinine Iron, Emetics. — Quinine by subcutaneous injection.
<i>Specifics against poison.</i>		
	{	Quinine, guaco, sulphur, teucrum polium, &c.

One might have hoped that by this time some statistical results of treatment would have helped us to judge of the value of the huge *armamentum* of remedies, of which only a portion is displayed in the preceding table, that they might have yielded us a sort of average treatment for the average of cases. But if there is much that is unsatisfactory in the

But if there is much that is unsatisfactory in the numerical method applied as a test of the value of remedies in other diseases, (and I have had special occasion to investigate such questions,) there is much more in the present instance. Other diseases give us time to make our observations. Cholera runs so rapid a course, and is so alarming in all the circumstances that surround it, that few but those who have long familiarity with the disease can judge accurately how far the phenomena before them, occur as a portion of the ordinary course of the disease, and how far they are to be attributed to the action of remedies. If any one tells me that all the cases he has treated with opium recovered, or that all the cases in which he exhibited purgatives died, or even the great majority of either, I know that there has been some defect of observation, or that the judgment has been run away with by prejudice in favour of some particular remedy, or of some pet theory.

I have repeatedly, when I have had hospital records of some extent before me, endeavoured to draw up some results of the various modes of treatment in this disease, but the task of framing any reliable statistics I gave up in despair; and I cannot say that the scanty results obtained in England are satisfactory to my mind, although the returns of the committee of the College of Physicians agree very much with the result of my experience.

The mortality in cholera varies in different years, and in different seasons of the same year, according to the stage of the epidemic, whether near its

commencement or its termination; the effect of remedies varies according to the stage of the disease, whether used in the premonitory one, or in threatening or in complete collapse. Dr. Griffin's returns on this point, already quoted, are very striking; then as regards the treatment, anything like unmixed treatment is never tried—purgatives solely, narcotics solely, emetics solely—there is always a mixture of remedies; and how are you to take into account the all-important adjuncts of an airy room, good nursing, careful administration of drinks and nourishment, or their absence?

I know well how difficult it is to be entirely dispassionate even in a statistical investigation, and how easy it is, without falsifying facts, to apply them so as to favour particular opinions.

These are some of the reasons for which I have little hope of ever seeing statistical results of treatment in this disease that will be reliable; and why it is necessary to review shortly some of the chief classes of remedies that have been employed.

A note at the end will give an idea of how the mortality in India has varied. I am unable to connect its fluctuations with any particular line of treatment. The mortality in the late epidemic in Paris seems to have been as high as ever, or about 55 per cent.*

* Gubler, Bulletin Général de Thérapeutique, Fév., 1866.

CHAPTER XI.

CLASSES OF REMEDIES.

FROM very early times, two systems of treating cholera have prevailed—the evacuant and the conservative methods. They at first sight appear to be in direct opposition to each other. The first system, however, has rarely been carried out in its full application. Its advocates seldom go through with it, and generally fall back more or less on the second. But while these two modes of practice are opposed in principle, there is some common ground on which both parties meet,—first, in using external applications to supply heat, or prevent its being lost, and in endeavouring to help the capillary circulation; of those means both sides avail themselves; the second ground on which they meet is the application of general hygienic measures; and a third must not be omitted, which has been claimed by either side, that of general blood-letting, and of large doses of calomel. These remedies are sometimes considered to be evacuants; sometimes to act merely by relieving the circulation, and by quieting vomiting and purging: and first, of evacuants, which are mainly represented by purgatives and emetics.

Evacuants.—I have already alluded to the analogy of the treatment of other blood diseases to which cholera is believed to be allied, and arrived at the conclusion that none of them are treated by active

evacuants. In the case of a mineral, vegetable, or animal poison after it has once been absorbed, it is useless to endeavour to eliminate it by emetics or purgatives; no one treats hæmorrhage by them, or the algide state of fever running into collapse. We do not try to eliminate typhoid poison by an active drain, any more than to eliminate small-pox by frictions of Croton oil, as has been mistakenly attempted. We know that the drain of premonitory diarrhœa does not prevent fatal cholera. If, then, we adopt the evacuant treatment at all, it is not from our experience of its good effect in kindred diseases; it can only be on some ill-defined notion of eliminating a poison, or by the practical application of the dogma "*Similia similibus curantur.*"

Such, however, has been the strength of the idea of the necessity of getting rid of morbid matter, that from the earliest ages the treatment of cholera has usually in the commencement been an evacuating one, beginning, however, only with mild emetics; the practice has come down to our days, and evacuating treatment has been tried over and over again, but apparently with results not satisfactory to the great majority of practitioners in any country who have tried it, even up to those of its employment in the recent French epidemic, according to Gubler's account.

Purgatives.—*A priori*, one would scarcely have expected purgatives to have had a very extensive trial, when we find the great majority of writers in all countries pronouncing their opinion that when cholera is prevalent, it is not safe to take aperients—

Twining, Martin, Morchead, nearly all writers, agree in this. It has been the common doctrine in Europe, and the latest experience in France confirms it. The very fact that patients so often attribute their attack to the use of purgatives, whether or not they do so on sufficient grounds, is at least enough to prove that purgatives do not avert cholera, and is not very encouraging to their employment.

Nevertheless, purgatives have had a very fair trial in India. In the days of active evacuant treatment, Mr. Craw* remarked, "I am convinced that after bleeding and the bath, a powerful purgative and a strong cathartic enema would have a much better effect than narcotics, the debility being imaginary."

The great Indian remedy of these days, Calomel, was not used for its purgative effects. Croton oil was tried on a great scale, but has not remained in use. Castor oil has been employed extensively in India in different stages of the disease generally along with some drops of laudanum. Calomel and colocynth and jalap have been used; also table salt in large doses, sulphate of soda, and sulphate of magnesia, sometimes with the idea of adding salts to the blood as well as of purgation; but they have never been generally popular, and were tried with little success during a recent epidemic at Dacca, in Bengal. Nor have physicians in Europe been better satisfied with the effects of purgatives. Dr. Laycock† writes of the premonitory stage of cholera:—"Charge your patient, as he values his life,

* Bombay Reports.

† Medical Gazette, 1848.

not to irritate his gastro-intestinal mucous membrane ;” and Dr. Maekintosh, reviewing the results of the very interesting experiments made at the Drummond-street Hospital, says :—“ I cannot state the fact too strongly that purgatives are dangerous remedies.” The combination of emetics and purgatives in the common Indian fever mixtures has often been tried in India, and had a fair trial in Paris in 1848. It was used chiefly at the commencement of the disease, and to check premonitory diarrhœa ; but the results were not then very satisfactory, any more than during the recent epidemic in that city.*

One particular purgative has been of late brought forward in Europe. Valleix† mentions a Dr. Henderson as having recommended the use of castor oil, and alludes to a case in his own practice where one ounce of castor oil provoked abundant diarrhœa, soon followed by fatal cholera. This medicine was recommended highly by Dr. G. Johnson towards the close of our last English epidemic ; but to judge by the journals of the day, and by Dr. Barclay’s‡ observations on the subject, found no general favour. It is difficult to see, why of purgatives this nauseous one in particular should have been selected.

When collapse is once established, purgatives are probably like all other remedies inert. If they are administered early in the disease they help to increase the amount of the evacuations.

* Gubler, *loc. cit.*

† Guide de Médecin.

‡ Medical Errors, 1864.

As to a later stage of the disease, practitioners, still pursued by the idea of the necessity for getting rid of peccant matters, are apt to give aperients too early. I quite agree with Dr. Bankier* when he says :—" When the symptoms are over I would give my patient a little rest for a day or so before having recourse even to gentle purgatives." Twining alludes to the bad effect of giving purgatives too early when recovery is taking place, and I have seen some of the worst relapses follow the too early use of castor oil.

It is just possible that in the early stage gentle aperients administered with great care and judgment may not be so injurious as we have had reason to suppose them ; but for ordinary treatment to recommend aperients, I consider to be a most hazardous practice. The misapplication of purgatives is often irremediable.

We turn next to a milder class of evacuants.

Emetics are the oldest remedies that have been used in the treatment of cholera. Recommended in Sanscrit medicine, by Celsus and Avicenna, and in later times by Sydenham, they have come down to our day. They have been much employed in India, and used on various notions, of eliminating the poison from the stomach, of rousing the system, of relaxing a spasm of the biliary ducts. They were often given, not as evacuants, but for their effect in producing an almost immediate change in the action of the heart and capillary system, which has been

* Essay on Cholera, 1838.

attributed mainly to muscular pressure in the act of vomiting. They have found various warm advocates, especially Dr. Gavin Milroy.* The most popular remedies of this class have been ipecacuanha, table salt, mustard; and many of my friends think them useful early in the disease. Tartar emetic also has been tried pretty extensively, and there are various Indian favourable reports of its action; but it is a more doubtful remedy.

On the whole, I have not the same objection to emetics as I have to purgatives, although I think we are generally better without them.

But I cannot treat of evacuates at the length which the subject deserves, and shall leave them with the remark that they are not to be recommended either on theoretical or on practical grounds; and I scarcely think that the ease is too strongly stated by Dr. Willis,† who reprobated their use, although the particular words are used by him when alluding to the treatment of ague according to theory:—"Curatio dogmatica medicamentis ut plurimum vomitoriis et catharticis nec non sanguinis emissionem constituitur, quibus misere exerueantur ægri et rarò profligatur morbus."

Conservative Treatment.—The great object of what I have ventured to call conservative treatment, is to husband the strength of the patient by endeavouring to moderate the amount of the evacuations, to support the patient throughout the attack, and to

* Medical Gazette, Oct. 1848.

† Thomæ Willis, M.D., Opera Omnia, 1682.

aid the system as far as possible in the period of reaction.

Of remedies used internally to produce such results, I regard narcotics as far the chief ones.

Narcotics.—Of remedies of this class I shall only speak of the most important, opium—a medicine which seldom fails to fulfil the intention for which it is given, and which has other besides narcotic virtues.

It is curious to observe, how early writers on cholera, like Riverius and Sydenham, after beginning with the idea that there is something to be got rid of by the aid of emetics, always fall back on opium if the intensity of the disease creates alarm. It is also remarkable how many theoretical views of the nature of the disease its use appears to meet. Violent shocks to the system, as from burns or intus-susception, hæmorrhage, spasms, whether of arteries or of muscles—simple bilious attacks, even agues, have been treated successfully by opium. Accordingly, there are very few cases of cholera, indeed, in which the exhibition of it in one shape or other is not adopted, and, if administered at the proper stage, no remedy, I believe, is nearly so effectual.

There has, however, for a long time been a dread of using this remedy from the fear of secondary effects. Opium is blamed at least as much as astringents or stimulants for the production of secondary fever, and I think unjustly. There is abundant evidence, both in Europe and in India,

that secondary fever has often occurred in patients who have had no medicines—who have been treated solely with cold water. A very strong tendency to sleep or drowsiness on reaction setting in is very frequently observed. “If we are so fortunate,” says Mr. Twining, “as to arrest the progress of collapse, the patient generally sleeps for some hours.” “This remarkable symptom of somnolence,” says Mr. Orton, “does not appear to be chiefly owing to the opium which has been exhibited; for I have seen it occur in an equal degree in cases in which little or even no opium had been given.” It has often occurred after early venesection also. When it does occur after opium, the symptom is usually a favourable one. “If drowsiness were produced by the narcotics, after sleep the patient generally awoke much relieved, with a warm equable sweat all over his body.” But such is the tolerance of opium, that no such effect is often produced by even large doses of it. I have already given some instances of this where opium was given in the solid state. With respect to its fluid form, Mr. Jameson, no indiscriminate advocate for its use, writes,—“A sickly native took 600 drops of laudanum in one night, and recovered; and a gentleman was saved from impending death by taking 400 drops. It never, in the largest quantities, produced affections of the head.”

In Paris the result of M. Louis’s experience according to Valleix, was that the fear that the nervous system, and especially the encephalon, would

be too much affected was greatly exaggerated. In the majority of his successful cases, there was no secondary fever; when it did show itself, it was not more violent than under other systems of treatment, and the number of deaths from the secondary fever was small.

If, therefore, opium has a curative effect, we need not shrink from its use from the dread of its ulterior consequences. The vast majority of practitioners have found opium extremely useful in the early stages of the disease. Men like Twining and Parkes, who by no means considered the disease to consist merely in vomiting and purging, are agreed that opium is the medicine to be given in the commencement of the great majority of cases. Twining believed that the disease was often arrested by it.

My own experience is, that in the premonitory and in the early stage of the disease, while there is a good pulse and before it has run into collapse, its effects are admirable.

If I feel confident that I have ever arrested a fit of ague by a full dose of quinine, I feel equally sure that I have averted many a case of cholera by a full dose of opium. In either case one can only talk of the highest degree of probability—in such matters no absolute proof is possible. During the panic attending the epidemic in boats which I have mentioned above, all the men who got frightened came to my boat and got a glass of brandy or wine with forty drops of laudanum, and I do not recollect that any of them returned as cholera patients. The native population

has the greatest faith in the cholera mixtures and pills dispensed to them during epidemics, the basis of which is opium. There is not a European resident who does not believe that he has warded off or cured cases of cholera by such domestic means.

To be of use, opium must be given early and freely. It is far better that the patient should feel next day the discomfort of a strong dose of opium, than that he should have an attack of cholera. But the time when opium can be most advantageously administered is generally over before a patient reaches hospital. Still, if collapse is not very imminent, while there is a tolerable pulse, opium, if given in a fluid state, may even then be most highly serviceable. The moment, however, it becomes plain that the disease cannot be arrested in its early stage, the opium is to be discontinued. In the state of collapse there is no great chance of its producing narcotism, still, if it were absorbed, the evacuations it was meant to check would have subsided of themselves, and it could have no beneficial effect on the circulation, which is by that time so much affected.

The benefits to be derived from the employment of opium are thus summed up by M. Gubler. 1. It calms the brain and relieves the distressing feeling of constriction at the epigastrium. 2. Perhaps it directly counteracts the over secretion of the intestines. 3. It at the same time favours cutaneous transpiration, and assists the action of *stimulants*, *astringents*, *carminatives*, or *absorbents*.

These classes of medicines, especially the two first,

are chiefly to be regarded as adjuncts to the opium. They are all more or less useful in the premonitory stage, when there is one. Far the most important of these astringents are sugar of lead and nitrate of silver. Of these, I have given a very extended trial to the former, and have found it most useful in premonitory diarrhœa. I should expect little from either of them with the disease fairly established, even if absorption were perfect; astringents are remedies which require more time for their operation than we can afford in cholera. While, however, I think their continued employment useless, I cannot say that I have any reason to believe that they would be positively injurious. There is little enough risk of their locking up secretions, as has been dreaded; and as to cumulative effects, although I have administered sugar of lead in very large quantities, I have never had occasion to observe them. Grey or muddy stools occur in the course of the disease quite independently of lead.

I think that astringents of the more powerful kind are deserving of further trial in the shape of injections, both because I have sometimes thought them useful in checking the discharges, and because there is during collapse a better chance of medicines being absorbed by the rectum than by other portions of the intestines.

Carminatives I regard merely as adjuvants of other remedies; they are often agreeable to the patients, and if their value be not very great beyond the premonitory stage, I cannot imagine their being at any stage other than innocuous.

Absorbents are of much greater importance. They are both innocuous, and, if they were only given in sufficient quantity, might aid materially in allaying the irritability of the stomach, and thus relieving one of the most distressing symptoms, and one which contributes most to exhaust the patient.

Astringents, carminatives, and absorbents are often indicated in the stage of protracted convalescence—when there may be obstinate diarrhœa or vomiting, and when the exhibition of opium is no longer desirable.

Stimulants.—The object of the administration of these remedies in cholera is to rouse a flagging circulation or to maintain the power of a failing heart. No doubt the analogy of hæmorrhage and their familiar use in all cases of sudden sinking of the powers, led to the early employment of alcoholic stimulants in cholera. Stimulants given in small doses are believed to aid the circulation; given in large to oppress it. Given in enormous quantities, as they sometimes have been, when they were supposed to add to the carbonisation of the blood already present, it is not surprising that they have often been found to do more harm than good; yet judiciously given they are a remedy not to be despised. These very large doses are probably at no time useful, but moderate doses can be given with much advantage in the early stage, particularly associated with laudanum. In Europeans alcoholic stimulants are not so effective as in natives, who are not accustomed to their use. It is in the early stage

that we expect most from alcoholic stimulants, but they have often been continued throughout collapse in small repeated doses, especially by the French. At that stage I prefer diffusible stimulants; ether and chloroform are both useful, especially with a view to the relaxation of spasm; but for keeping up stimulation throughout collapse ammonia is the main stay. It may be given very freely throughout, and the particular shape in which it is administered is a matter of comparative indifference. The compound spirit of ammonia is a very convenient form. The liquor ammoniæ in wonderfully strong doses, once enjoyed very high repute in India, while the valerianates and succinates have been favourite preparations in Europe.

Camphor and turpentine also may be used throughout collapse. I have never had occasion to think them injurious, and have sometimes been much pleased with their administration. Turpentine ought to be particularly useful, if, as may be hoped, it favours the restoration of the renal secretion at a later period. A host of other remedies which may be classed as stimulants might be here noticed, but our knowledge of their operation in cholera is so vague, that nothing is lost by avoiding an examination of them.

To draw my remarks respecting conservative as opposed to evacuant medicine to a close: it is surely quite as philosophical and in analogy with the treatment of other blood diseases, to endeavour to husband the strength of a patient, as it is to run

the risk of increasing his weakness by an attempt to increase the discharges. If we look to the history of the past, down to the date of the late Paris epidemic, we shall find that the promoters of an evacuant treatment have been vastly in a minority in Europe, and that its advocates must reject the results of past experience.

We have now arrived at neutral ground—at modes of treatment adopted by practitioners holding the most various views of the disease.

Of these far the most important is *venesection*. It has been employed from a very early period, and with many objects. It was used to relax spasm, relieve venous congestion, with a vague notion “that it might interrupt vitiated visceral secretion,” and of late years chiefly to relieve the circulation and respiration. Though a remedy belonging to the class of evacuants, it has scarcely ever been used, I imagine, with the view of eliminating a poison. The most various effects have been attributed to venesection—their nature, no doubt, depending on the period of the disease when it was practised. In the early stage, when blood flows freely, it is a powerful agent; at a later stage, when a few drops, or only an ounce or two, can be got to flow, it must be indifferent.

Bleeding was for a long time enthusiastically practised in India. G. H. Bell did not give up repeated bleedings while life lasted.

Successful blood-letting seems very generally to give great relief to the circulation. One of the

most favourable reports says:—"Whilst the blood was flowing the patients generally expressed themselves to be much relieved; the spasms instantly abated in violence, and in very many cases disappeared. On a second bleeding sound sleep frequently occurred." Many early observers considered that it checked vomiting and purging, whereas Dr. Kennedy had occasion to observe "that it not unfrequently happened that when the blood began to flow, the natural course of vomiting and purging commenced again"—an effect which he liked to produce, but which most practitioners would desire to avoid.

When I arrived in India in 1840 I found venesection was the common practice in Calcutta; and in an epidemic in 1842 I gave it a fair trial in a good many cases which I had pretty completely under my own observation. In some cases, even when the pulse was not quite gone, only a few drops, or at most an ounce or two, could be got to flow. All such cases, and even one in which I got eight ounces, died. In other cases, when venesection was tried early and blood flowed freely, there was an immediate feeling of relief about the præcordia, the action on vomiting, or purging, or cramps, being however uncertain. No case in which blood flowed readily died; but then it is to be remembered that venesection was not the only remedy employed, and that, if blood flowed freely, the case was one that had come early under treatment. Still, the general result was, that blood-

letting before the pulse was gone, and still more while the pulse was good, was a valuable remedy. I also found that blood-letting was better adapted for the European than for the native constitution. In all this I was arriving at the same conclusions as Mr. Jameson, showing that, in the course of twenty-five years, there was no material change in the effects produced by blood-letting. It must be remembered of this, as of other remedies, that their applicability depends much on the character of the particular epidemic, blood-letting being most useful where the disease sets in most rapidly with threatening of collapse: most applicable to the cases of strong healthy men; not at all so to those of men already reduced by previous disease. In spite, however, of no actual dissatisfaction with the results of this experiment, I gradually gave up bleeding. Its employment requires much discrimination. If employed too late it is a depressing agent—that is, if blood be got to flow. On the whole, we do better to avoid it, although it is worth trying in cases where it is too late to attempt much by mere medicines.

In Europe venesection has not maintained its ground, and is considered chiefly applicable to the stage of reaction. It is curious to find Riverius discussing the question of general bleeding in the reaction of European cholera; and he remarks that general bleeding at that stage often got the credit of killing the patient. I have never myself had occasion to try venesection in secondary fever; and, indeed, I should dread its effects in the class of

cases with which I have been familiar : for such cases leeching is far more applicable.

I have never, like the French, applied leeches to the epigastrium during the acute attack of cholera ; but I should not expect much from their use.

Of *injection of fluids into the veins*, with or without alkaline salts, I shall say little, having never seen it practised. Nevertheless, its temporary good effects have far exceeded those of venesection ; unfortunately they are not permanent. These effects are doubtless attributable mainly to dilution of the thickened blood, partly to the washing away of débris, which allows the renewal of tissue to recommence, and possibly to the warmth of the fluid injected. Mr. Scriven, Principal of the Medical College, Lahore, a very acute observer, assures me, however, that he has produced this marvellous revival with injections of fluid of the normal temperature of blood. The operation is in itself one of considerable gravity, and scarcely one of general application. It is an experiment so far in the right direction, being an attempt to supply to the blood the fluid that is wanting ; but it is seldom in medicine that we can treat an indication so directly with any success.

As to attempts to aid the *aëration* of blood by the inhalation of moist air, of oxygen and other gases, they have hitherto been unsuccessful. Chlorine appears of late to have been used for this purpose in France.

My friend Dr. Wise, following Dr. Kellie, of Leith, who applied them to the treatment of ague, has employed tourniquets, with the idea of preventing a flow

of blood from the extremities, of retaining more blood in them than usual, and thus endeavouring to relieve central congestions. I cannot say, though I have never tried it, that I should hope more from this procedure, than from the moist metallic armatures of M. Burq. I can readily believe, with Dr. Begbie, that tourniquets relieve cramps, like the ligatures which D'Horta found used by the natives of Malabar to relieve the cramps of the *haiza* that prevailed three hundred years ago, and which to this day are employed by them; but not that they can influence materially the progress of a case of cholera.

Another neutral ground should now be entered on: the various attempts that have been made to increase the capillary circulation, and to maintain or to communicate warmth. These may be more or less useful, if the patient is not tormented unnecessarily or raised from his bed. But to avoid the risk of repeating myself, I shall say what occurs to me on this subject in the concluding chapter on Treatment.

Nor shall I attempt to discuss at length the interesting but rather obscure question of the frequently non-purgative and non-emetic properties, or rather the absolute power to suppress vomiting and purging, which scruple doses of *calomel* and sometimes large doses of *ippecacuanha* appear to possess. These large doses of calomel in cholera and in some other diseases, are certainly not purgative, although it has never been settled what the exact nature of their operation is. It has been called variously sedative and stimulant.

Calomel has from the first been very largely used in India in cholera, and in two ways: in scruple or still larger doses, as it has been used in dysentery, with the apparent effect of quieting the stomach and bowels; then again, in smaller doses, for its supposed cholagogue effects. Given in full doses it is often retained by the stomach, and though inert during collapse may begin to operate during reaction. With his large doses of calomel, Mr. Corbyn gravely assures us that he lost only two out of 110 cases of cholera; unfortunately, others were not able to attain similar results. Small doses have on the whole certainly been regarded favourably by a large body of practitioners in Europe, as Ayre in England, and Pfeufer abroad. Dr. Griffin, after a careful analysis of cases, arrived at the result that large doses in the early stage, and before collapse, were very efficacious. Calomel, however, is a disagreeable medicine to use, with the risk of salivation, although in cholera I did not very often find it occur with small doses which I have chiefly tried; and unless it has a power of quieting the stomach, I know of no very positive indication for its use.

No one now believes that cholera can be cured by salivation.

Before leaving the subject, I shall merely remark, that I believe it to be an error to ascribe the green motions and obstinate green vomiting, which are often among the sequelæ of cholera, to the use of mercury. I have often seen them in patients who had not received a grain of that medicine.

CHAPTER XII.

TREATMENT.

THERE should be no exclusive treatment of cholera ; our treatment must vary according to the particular symptoms of the case and character of the epidemic ; it should be based as much as possible on views of the disease as a whole, not limited to particular symptoms. One general view should run through all our practice, grounded in our knowledge of the natural course of the disease.

If the disease does not stop in the preliminary stage or before collapse is established, we know that remedies given in that stage have no certainty of being absorbed ; that it is the natural tendency of vomiting and purging to cease after a time ; at a certain stage we expect the circulation and aëration of the blood to be suspended, and the secretion of bile and urine to stop, that before collapse becomes complete and ends in death, there is usually a tendency to reaction ; if the reaction be perfect, the circulation will gradually be restored, and with it the warmth of the body, and the secretions will begin to be restored more or less slowly. To this may succeed pretty rapid complete recovery or more protracted convalescence, possibly a return of collapse, or a struggle through cerebral symptoms

or low fever. Our chance of being able to arrest this chain of phenomena is only at the earliest period—that is the time for action. At a later period action is much less effective. It seems also to be pretty generally admitted, that the slower the stages of the disease are, and the less acute, the better are the chances of recovery.

Hence, if we cannot arrest the disease in the onset, our object is to protract the stages and moderate their violence. This we do by endeavouring to support the strength of the patient, by moderating the excessive vomiting and purging which are highly exhaustive to him; by endeavouring to aid the circulation and aëration of the blood so far as we can, by assisting if possible the secretion of bile and urine, and watching the patient carefully through the various sequelæ that may arise.

It is very easy to lay down such general indications on paper, but to carry them out practically is the great difficulty. When a practitioner has a case of distinctly developed cholera before him, he has a problem of no ordinary complexity to address himself to. Many a physician who has done his best against one of the most violent modern epidemics, has arrived at the disheartening conclusion that all or no treatment was alike. But this should not be so.

Before stating what has appeared to me to be the best average mode of treatment of ordinary cases (and after our lengthened examinations of different classes of medicines, this may be done briefly), I shall make two more observations of a general kind.

Perhaps I may be merely uttering a commonplace which applies to all diseases, but which still is peculiarly applicable to cholera, in remarking, that our great object is to keep the patient alive as long as possible; for if he lives a certain time, there is usually great ground to hope that nature will begin to repair the injury that has been inflicted, and that the patient will struggle through—and that we can assist in producing this result quite as much by careful management and nursing, as by the direct influence of medicines. My other remark is, that in no other disease has the *nimia medicina* been carried out to so great an extent, and in none more uselessly.

Premonitory Diarrhœa.—The treatment of this affection is probably our most important means of prophylaxis. A patient who during a cholera epidemic gets diarrhœa, pays attention to it, and places himself under treatment, is indeed fortunate. He has every chance of escaping the disease in its worst form. Unfortunately, in the great majority of cases, although there may be a considerable feeling of general malaise, the diarrhœa, being frequently painless, is allowed to go on, and does not attract serious attention until a violent invasion of the disease is imminent.

The treatment of premonitory is essentially the same as that of ordinary diarrhœa, only that as a matter of precaution it is always wise to add opium to our medicines. The old Indian pill of one grain of opium, with two of assafœtida may be given

at once; or two grains of sugar of lead, with one grain of opium, or ten grains of Dover's powder, and repeated if necessary in a couple of hours, or an equivalent amount of laudanum in brandy or in aromatic water, or in common chalk mixture, will answer as well. The patient should lie down and keep himself warm, using bland diluent drinks, avoiding solid food; hot fomentations or warm cataplasms to the abdomen may prove soothing; and astringent or opiate enemata are often useful; should there be a tendency to colic, turpentine stupes or sinapisms to the abdomen may be required, and ehlorodyne or mixtures akin to it relieve the pain. By such treatment the diarrhœa is usually checked, and the patient often saved from an attack of cholera. Of course all diarrhœa in cholera times is not necessarily that disease in its incipient stage.

If there be the faintest suspicion of cholera, I cannot recommend the employment even of mild emetics or aperients. Less harm will probably be done by ipecacuanha or Gregory's powder than by any other medicines of these classes.

Invasion of the Disease.—But if we have failed to check the premonitory diarrhœa—or if, as is often the case, it has been wanting—if the bilious discharges of diarrhœa are turning into the enormous rice-water evacuations of cholera, and vomiting has been superadded and the circulation begins to fail, and cramps are very distressing, opium is still our chief remedy for a time; and if it is to have a chance of acting, it should be presented in a fluid state. I prefer small doses of laudanum to any pills. Pills

of one grain of opium, or of one grain of opium and five of calomel, are often given, but are speedily rejected or pass away. Of course a great portion of the laudanum is also rejected; and the practitioner, who must not be absent, must endeavour to estimate how much may have been retained. Small repeated doses of chloroform sometimes seem to quiet the stomach and relieve the cramps. Inhalations of chloroform often give temporary relief; small doses of calomel are sometimes retained, and if not given to meet any very certain indication at the time, may at a later period be supposed to aid the secretion of bile. Chalk powder, magnesia, or bismuth given in full doses may help to check the irritability of the stomach and the profusion of the discharges. At all events they are innocuous. I would apply the same remark to sugar of lead, or to vegetable astringents, if they can be retained. Injections of cold water into the rectum are said to have proved soothing; and I have sometimes thought injections containing sugar of lead or nitrate of silver beneficial. Stimulants are here of use to endeavour to assist the circulation; both alcohol in its various forms and diffusible stimuli—small quantities of brandy-and-water—punch much employed in former days in France—or small quantities of beer, which has lately been a favourite—may be all tried, as may suit the feelings of the patient or the circumstances of the case. Champagne is sometimes, for a time, grateful to the patient. Of diffusible stimulants, ether and ammonia are the most convenient, especi-

ally the latter ; small doses of tincture of camphor or of turpentine I have sometimes thought useful. At this stage it is needless to attempt to load the stomach with food that cannot be retained. Small quantities of iced water, and pieces of ice allowed to melt in the mouth, have a much better chance of being retained than too copious draughts of water. The patient prefers cold to hot drinks, although the ancient elimination treatment prescribed warm ones. The patient complains of want of fresh air ; and it is important that he should have plenty of air about him. I do not know that currents of hot air, inhalations of oxygen or other gases, or of moist air have ever been of any use. Meantime, every effort should be made by external applications to aid the capillary circulation and help to relieve the cramps—frictions with turpentine and oil, or with dry ginger powder—or with cajaputi oil, as was once popular—all come under this head ; as does the application of bottles of hot water or hot water tins, or bags of bran or hot fomentations. But the patient will not usually allow anything to be applied long, and in his excessive restlessness cannot bear even the ordinary coverings of a bed. The application of a hot-air bath was one of the earliest Indian remedies, and although it could be used without disturbing the patient much, was of little use. Hot baths have sometimes appeared to me to give temporary relief, but they are exhausting, and everything that makes the patient quit the horizontal position is to be avoided.

Collapse.—If in spite of these remedies the dis-

ease has gone on its course, and entire collapse has ensued, there is probably a cessation of violent vomiting and purging, and a tendency to stupor. Long before this period the opiates will have been given up—it is useless in this stage to give any drugs in the hope of their producing their specific action—but we must not on this account intermit our efforts to be of use. Drinks must be given in small quantity to relieve the craving thirst. Stimulants are to be given sparingly, and their effect on the pulse or the respiration carefully watched. Large quantities of alcoholic stimulants are injurious at the time, and if retained, help to disturb the stomach, when reaction with absorption comes on. But I believe that in almost any state no harm can be done by continuing the use of small quantities of ammonia. Violent measures of blistering the spine, applying caustic acids, or the actual cautery, have been used in this stage in the expectation of rousing the patient; but nothing is to be expected from such means. Subcutaneous injections have been usually employed in this stage. I know nothing of them. At this period either death comes without reaction, or reaction and the struggle for life commences.

Reaction.—When this sets in, little is to be done except to keep the patient in as comfortable and as cheerful a state as is practicable, taking any opportunity that may present itself of helping the system, but above all avoiding unnecessary interference. The great rule at this stage is to let the patient alone as regards drugs. Sometimes, when the reaction is

inclined to retrograde, the careful use of stimulants may be of use; further support may be given by small quantities of fluid nourishment—milk with a little magnesia or lime-water has long been used for this purpose. Beef-tea is probably the best nourishment; animal food suits better than farinaceous. At one time practitioners were always in a hurry to give a purgative to “get rid of vitiated secretions and prevent fever;” but usually there is still some diarrhœa, as much as is desirable, and even a mild purgative given at this time may induce a fatal relapse. The return of the renal secretion should be watched, and it is sometimes necessary to draw off the water. If reaction goes on favourably and uninterruptedly, the patient may be well and out of our hands in a day or two; but in a very large proportion of cases our patients are not so fortunate, and still have to struggle through a great deal.

Sequelæ.—The treatment of the sequelæ must vary according to their nature, which is far from uniform.

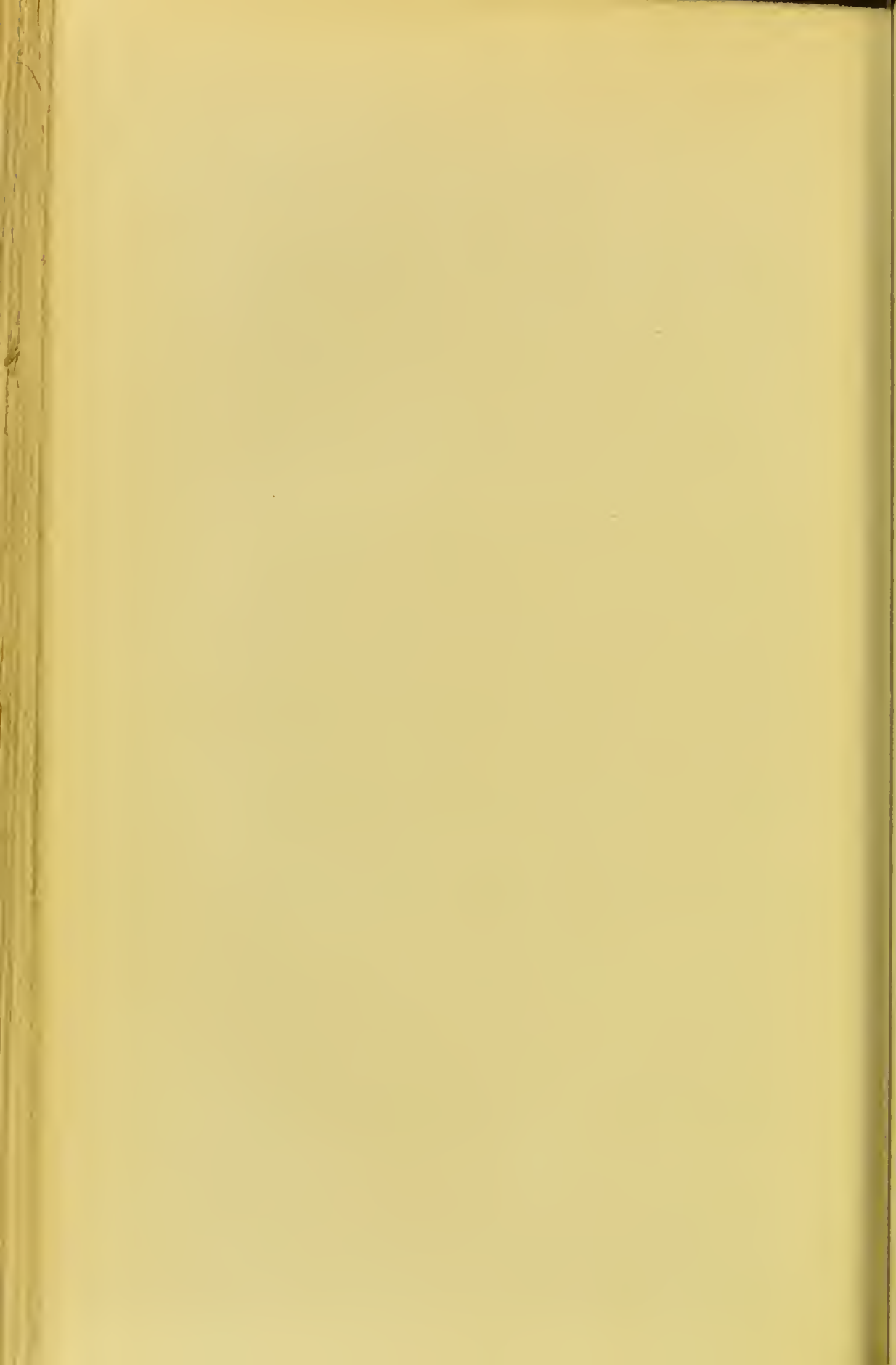
There may be a continued tendency to diarrhœa, for which gallic or sulphuric acid, with or without the addition of a little opium, may be appropriate. Various other astringent mixtures may be useful, and occasionally a warm aperient may be of advantage.

Great irritability of stomach, with vomiting of green fluid, may continue, for which hydrocyanic acid or bismuth may be used with advantage, or a blister to the epigastrium, and dressed with a little morphia, may be required.

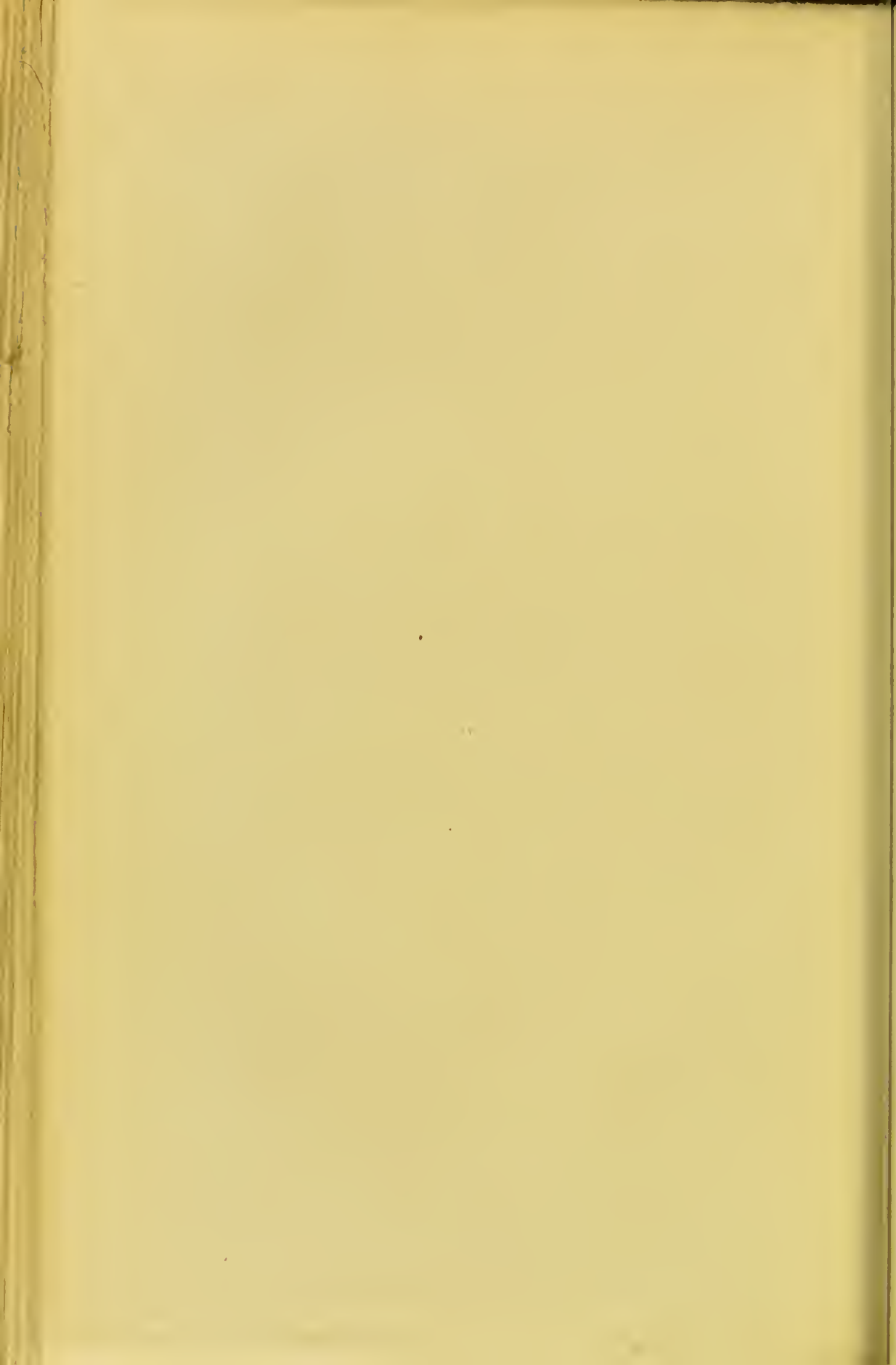
The lungs may get congested, and demand our attention. Very frequently there is a good deal of febrile reaction, which may suddenly lead to violent delirium, coma, and death. Most cases require to be very carefully watched, and the patient must not be allowed to rise suddenly from his bed ; a blister to the nape of the neck, and probably leeches to the temples will be required, along with other treatment, directed, if possible, to prevent the effects of uræmia.

When the secondary fever is of less active character, and assumes the appearance of typhoid, mild eliminative treatment is indicated. A few grains of calomel may possibly be useful in acting on the biliary secretion, and nitrate of potass and small doses of turpentine may favour the reaction of the urinary organs. To attend to this secretion is one of the most important indications. Sloughing sores, sloughing corneæ, inflamed parotids, or other sequelæ, must be treated on general principles.

If the convalescence has been greatly retarded and the patient does not regain his strength, quinine and tonics, and lastly, change of climate, must be prescribed.



PROPHYLAXIS.



CHAPTER XIII.

PROPHYLAXIS.

THE various hygienic arrangements to be made, and the precautions to be used, in the event of an invasion of cholera, have been very fully laid down of late years. They will be found at length in Tardieu, Dictionnaire d'Hygiène, Dr. Baly's Report to the College of Physicians, in Simons' Third Report on Public Health in England, and in various military standing orders, many of them having special reference to India. Professor Parkes's elaborate work on Hygiene, contains a *résumé* of all that is to be done on such occasions. With these abundant sources of information open to every one, it is unnecessary for me to do more than refer to a few general principles.

Whatever opinions we may entertain respecting the causation of cholera, whether or not we assume the existence of a specific poison, whatever degree of importance we may attach to atmospheric or other influences, whatever may be the cause why a disease, which had existed for centuries assumed a shape of new virulence some fifty years ago, or as some prefer to think, appeared then for the first time, we cannot attempt in any way to act directly against causes, with which we are not acquainted.

But we know when we examine the history of

cholera on the large scale, that certain conditions of places fit them peculiarly to be a nidus for the disease; and that certain causes appear to increase in individuals their receptivity for it. It is to these two classes of facts that our hygienic measures are to be addressed, and we endeavour to remove everything that can form a nidus for the disease, and to place individuals in such favourable circumstances as to diminish their receptivity.

The idea has been broached that we should endeavour to stamp out cholera in its birthplace—that if we are to strike at the root of the disease we must attack it in its home. But to adopt hygienic measures on such a scale as to hope to eradicate the disease from Lower Bengal alone, would be attempting more than the cleansing of the Augean stables; to extend such measures all over India is utterly beyond our powers.

Possibly by great care we might in the course of years nearly banish cholera from our barracks and our jails, but the number of cases occurring in them is a mere drop in the bucket, as compared with the ravages of the disease in the native population; in Calcutta alone the deaths of natives in one year equal all those in H.M. large army in Bengal for twelve years. The notion that it is possible by any combination of measures to eradicate cholera from India is purely chimerical; and when the disease does diminish in frequency and intensity, it will be from some cause the nature of which we know not, and our ignorance of which we hide under the shadow

of the term epidemic influence. But we are not on this account to rest passive.

The subject of prophylaxis may be divided into public and individual ; and first of public.

(1.) Some of the most important rules of public prophylaxis are based on the belief in the communicability of the disease by man or by his excretions.

The first question that arises is the advisability of isolation and of quarantine. To be absolutely effective, any cordon or quarantine is only applicable when the points of access to a country are few, and its intercourse with other countries small. When there is a large frontier or a large seaboard (and ships do frequently appear to carry cholera) its successful application is scarcely practicable. In earlier visits of cholera to Europe it seems to have always failed ; and in the case of a country like England, putting out of the question its immense inconvenience to commerce, it can scarcely be expected to be efficient. If indeed the view be accepted that persons suffering from diarrhœa, and even healthy people coming from the seat of cholera, may propagate the disease, quarantine can be of no use unless protracted to an immoderate length, such as could not be tolerated in this country.

I understand Pettenkofer and other writers to say that cholera quarantine has hitherto been inefficient, through our ignorance of the fact that the seeds of the disease were contained in the excreta. Pettenkofer considers that no quarantine can be effective, except by disinfecting all the excreta as well as all the

clothes of people coming from where cholera prevails. He thinks that special measures should be adopted to effect these objects at railway stations, and at all the principal hotels in frontier towns; but he admits that it would be frightfully expensive, and he is unable to suggest any practical plan.*

On the subject of contagion and of quarantine, there seems of late to have been a remarkable revulsion of feeling. Fifteen years ago the doctrine of contagion was out of fashion, and quarantine against cholera was all but abandoned in Europe; but of late years, with an increased belief in the contagiousness of the disease, the faith in the value of quarantines has been renewed, and its advocates have pointed triumphantly to the exemption from cholera during the past year of Greece, Sicily, and the Papal states.

The question of quarantine is in its present shape limited almost entirely to efforts to check the advance of the disease through only one of the channels, through which it has reached Europe, that of Egypt and of the Mediterranean.

Of late years cholera has occasionally prevailed in towns on the Red Sea, and outbreaks have occurred at the immense meetings of pilgrims at Mecca. Some of these outbreaks may doubtless be traced to Indian pilgrim ships. From Mecca the disease may reach Suez by land, or more readily by sea. It has often done so; and it is surprising to me, that, in a soil like that of the delta of the Nile, ever

* Zeitschrift für Biologie, 1865.

fruitful of pestilence, the disease has not yet become endemic. There are various routes by which cholera may reach Europe; but the likeliest route is by ships from Alexandria or the Levant.

If we are to strike at the root of the disease, we must attack it in its Indian home; but failing in power to eradicate it, the next task—and a most difficult one it would be—is to try to keep pilgrim ships in a better condition, in the hopes of preventing outbreaks of cholera. How difficult this will be may be conceived, when the Indian government, after years of attention to the subject, cannot prevent cholera on board coolie ships, and when first-class English vessels and steamers often carry it with them from the Hooghly. When pilgrims once arrive at Mecca, much may be done by giving them ample space, and making such provisions for cleanliness and drinking-water as seem to have proved so beneficial at Conjeveram, near Madras.* On leaving Mecca, to insist that the unfortunate pilgrims (those not from India) should wander back through the Hijâz, or even to subject them to quarantine, or to place them on any island in the Red Sea, will entail on them much suffering and mortality. The first of these measures would undoubtedly be an act of the greatest inhumanity. When the cholera has once reached Egypt, we can enforce quarantine regulations against Alexandria, and any other Mediterranean port to which it has spread.

* Dr. W. B. Montgomery, *Medical Times*, 1866.

I have myself no practical experience of the operation of quarantine, and therefore shall merely remark that the general experience of the past has gone to show that it has been a very imperfect prophylactic. My experience in India has been, that when patients suffering from cholera, or from its premonitory symptoms, have arrived at places where the disease is not present, the disease does not usually spread, and is only likely to do so at certain seasons of the year, known to be in that particular district the ones favourable to the diffusion of the disease.

There is, undoubtedly, something in the crowding together of human beings that favours the spread of cholera. On this account, in countries where cholera prevails, and especially when it is epidemic, it is particularly desirable that all public assemblies, great meetings, markets, religious festivals, or processions, all massing together of large bodies of troops, should be avoided as far as is practicable. In countries in which cholera is frequently present, I doubt the policy, as a hygienic arrangement, of building large barracks or great central jails. Smaller, separate, detached buildings are better.

It was once very clearly shown before a committee of which I was a member, that the healthiness of emigrant coolies appeared to depend much more, on their number in any one ship not being very great, than on the accommodation they had; for small ships proved to be healthier than large ones with better accommodation, which gave more cubic feet of air to

each man than the small ones, but carried a much larger body of men.

Whatever weight we may attach to opinions regarding the vehicles which may contain the specific poison of cholera, all are agreed as to the necessity for the free use of disinfectants, and for a supply of pure drinking-water.

Chloride of lime or Condyl's fluid should be added to the excreta, which should be immediately removed, and buried; washing apparel should be plunged in boiling water, or washed in water containing either of them. Woollen bedding or clothing should be exposed to a heat of 210° Fahrenheit.

Chlorine gas, to purify the air of hospitals, or at least as a deodoriser, can be readily generated with peroxide of manganese and hydrochloric acid. The interior of rooms or wards in which there has been cholera should be whitewashed. Any other disinfecting processes may be carried out as may happen to be easiest of execution.

While, however, every reasonable precaution against contagion should be used, the public should have it explained to them that nursing their sick friends involves no unusual risk. To fill the public mind with ideas of extreme contagiousness can only lead to unnecessary panic, and to patients being deserted by their friends in a disease for which it is often so difficult to procure adequate attendance.

(2.) Next after contagion, we have to fight against predisposing and exciting causes—against everything that can afford a nest to cholera—against filth, cess-

pools, drains, stagnant water. Cholera, in the main, like typhoid, selects the foulest and worst-aired localities, although there are often striking exceptions to this rule. This includes all the hygienic operations that have been of late years carried on with more or less success in large cities. They cannot be carried out in a few days or months, and therefore are of little avail if the cholera is once upon us.

But the measure which it is never too late to adopt, and which I believe is of more importance than all others put together, is to give the poor and the working classes better houses—to give them more space and more breathing room. Three hundred to five hundred cubic feet is the minimum amount of air that adults should have in temperate climates. With more space would come improved habits of cleanliness, more self-respect, and less vice. I believe it to be mainly from their better dwellings that the rich usually enjoy a comparative immunity from cholera, that officers suffer less than their men.

The removal of the poorer inhabitants to temporary houses of refuge while their own are being cleaned and ventilated is a very judicious measure, which has been followed with success in some European cities. But that and similar measures can only be carried out when there are really working committees whose members heartily co-operate with each other.

Cholera often comes and often goes, when it is

impossible to assign any reason ; but based on the idea that something local of a deleterious nature may be escaped from, and on the benefit of change of air, the measure is now very generally adopted of making troops quit their barracks, and in India, even prisoners are taken outside their jails with good effect. There is some variety of opinion regarding the judiciousness of always enforcing the Indian army standing orders for troops to move out of cantonments when cholera breaks out. That in the main it is an excellent rule I have no doubt, although positive evidence of its efficacy has not yet been published. But there may be occasions when it is inexpedient to act on it. If the cases of cholera are only sporadic—if the season of the year is the height of the rains—and if there is no good ground in the neighbourhood for the men to move to. The shorter and easier the move is, the better. The immense use of a ship changing its berth, moving a short way up or down a river, has already been adverted to. Troops are directed to move if possible at right angles to the prevailing wind ; and ships are recommended to beat to windward, or lay their broadsides to the breeze.

The importance of attending to the quality of the drinking-water is paramount, although we believe that some have been run away with by too exclusive views on this subject. We know something positive of the effects of the inorganic, very little of those of the organic impurities of water, at least that is definite.

(3.) But during cholera epidemics we require extraordinary measures, to carry out these operations; to guard against crowding and collections of filth, and to give ventilation; and on this account from the earliest times in England, special committees have been formed to effect these objects by seeking out the homes of the poor; another important duty is to arrange for domiciliary visits, for dispensary hospital aid.

Ordinary measures are not sufficient for such times. Government should issue notices warning the people of the necessity of applying early for aid. One of the great difficulties in epidemics, and one that adds greatly both to the alarm and to the mortality, is the want of previous arrangements, and of a sufficient supply of medical officers, hospital attendants and nurses; committees should arrange for the organization of such medical aid—and this must be done beforehand.

In established hospitals wards may be set apart for cholera patients; but there should be a number of temporary hospitals in different districts. A question has been raised whether such hospitals should be of canvas: I think unnecessarily. Houses are most convenient, and best suited for care and nursing; but tents may be more easily supplied in a hurry, and may do better for the summer and autumn months, when cholera prevails most in Europe, than for other months of the year; still the changes of temperature in tents are always too great.

It has been suggested that cholera hospitals should as far as possible, be divided into three portions : one for suspected cases, one for the developed disease, and one for convalescents. Any one who is familiar with the horror of an epidemic, will agree that small wards, and as much division of the patients as is practicable, are desirable. Anything that will prevent unnecessary panic and alarm, is clear gain at such times.

Dispensaries can be of great utility in distributing freely medicines of a class suitable for premonitory diarrhœa. Supplies of medicines should always be at hand when domiciliary visits are made, and in cholera times all regular practitioners ought to be allowed to give prescriptions to be made up gratuitously at certain fixed depôts. Half-an-hour's delay may render the administration of a medicine useless.

(4.) For individual prophylaxis our directions are very simple. Everything is to be done to maintain health at its usual standard, or a little above it.

Indigestible articles of diet, or anything likely to provoke inordinate action of the bowels, are to be avoided.

Wearing a flannel belt round the abdomen is a judicious measure.

Quinine has been recommended as a prophylactic, and there can be no possible harm in taking a few grains of it daily ; and it is well to take a cup of strong coffee on rising.

But I have known a patient in hospital with

diarrhœa get cholera, after taking five scruples of quinine.*

I have known men of intelligence in India have faith in the inoculation of a few drops of tincture of Quassia as a prophylactic; and this formed the subject of a grave correspondence between the Bombay government and its medical authorities.

The question of flight arises. Inhabitants of cities who have it in their power have been recommended to seek the country, or the mountains of Wales or Scotland. This advice, and the cry, "*Heu! fuge crudeles terras,*" seems to me a little pusillanimous. However, it is only within the reach of the wealthy; and others who have recourse to it may remember that, according to the latest views, they, in leaving a place where cholera is raging, may carry the disease with them; and also, what certainly accords with my Indian experience, that if they have occasion to return to a place where cholera is prevailing, they are more likely to get the disease than if they had not left it.

The remaining point is, that the public should be warned as to the necessity of endeavouring to check attacks of diarrhœa. The number of medical authorities who would encourage it, is wonderfully small. The people must be warned not to think lightly, as patients usually do, in cholera times, of bowel attacks, but at once take the usual remedies before applying for regular medical aid. I believe that

* On Antiperiodics. Calcutta, 1856.

this one measure, if fairly carried out, would do more than any one other to diminish the mortality of the disease.

The late Report of the Bengal Commission on Cholera is said to have attributed much of the unusual mortality of late epidemics to the neglect of premonitory diarrhœa, and other simple measures of prophylaxis.

In barracks and jails, the men ought to be examined at least twice a day with the view to the detection of diarrhœa, which should be immediately checked. The diarrhœa is often allowed by the soldiers to go on unnoticed.

NOTE ON THE MORTALITY OF SOLDIERS IN INDIA BY CHOLERA.

I HOPE that the following tables will give some idea of the ratio of deaths to admissions, although the more closely old returns are examined the less trustworthy they appear. Even up to a late date a great proportion of cholera cases—certainly cases yielding a very high mortality—have been classed as cholera biliosa; and diarrhœa must be a very vague heading; for in H.M. army in Bengal—

In 1830 there were 522 cases of it, 2 deaths.

„ 1833	„	„	470	„	25	„
„ 1840	„	„	2008	„	129	„
„ 1860	„	„	5259	„	42	„
„ 1843	„	„	817	„	3	„

These proportions are so various that they suggest some grave mistake in the way in which such returns could have been kept.

I. Earliest Mortality.

The perusal of any of the early reports on cholera gives the impression that there must have been great mortality, as there was great alarm; but it is very difficult to get early reliable information as to the mortality of cases treated. This is one of the most distinct statements in the Bengal Report:—

“From November, 1817, to May, 1819, the total amount, as shown by the superintending-surgeon's returns, was of seizures 1540, and of deaths 483 (31·4 per cent.), a large proportion, being nearly a third of the whole. This is entirely exclusive of the camp followers.

But these returns do not exhibit a fair estimate of all the deaths; for there is reason to suspect that, in the early part of the pestilence, many persons who died from cholera were classed under the head of bowel complaints or of anomalous cases."

The only return given by Jameson for native troops, that looks like an accurate one, is the following of the 1st battalion 28th Native Infantry:—

57 Brahmins attacked, 30 died.	
47 Rajpoots ,, 16 ,,	
21 Pariahs ,, 9 ,,	
19 Mussulmans ,, 5 ,,	
<hr/> 144	<hr/> 60, or 26 per cent.

Of the 108 first attacked 51 died; and in the Sirmoor battalion there were 113 cases, 74 deaths. This last is given as an extreme case, and the high mortality partly attributed to the absence of the regimental surgeon.

II. *Comparative Mortality of H.M. Troops in the three Presidencies.*

Dr. Barclay, of the Army Medical Department, has most obligingly furnished me with tables of the mortality of troops from all bowel complaints, from the time since which accurate returns have been kept. I have only space for the per-centages for cholera. I give two columns: one the per-centage of cases returned as cholera; the other, the same, corrected by adding the cases of cholera biliosa:—

	Bengal.	Corrected	Madras.	Corrected	Bombay.	Corrected
1826—30	27·5		37·4	22·9	36·9	35·0
1830—39-40	42·5		48·0	34·8	25·2	24·2
1840-41—1850-51	50	43	55·4	50·8	45·6	44·7
1850-51—1860	53·4	53·5	46·2	50	51	50·4
1861—1863	63	63	51·3	43	71	70

Cholera biliosa was not a heading in Bengal before 1840. The classification has evidently been loose and varying, for while it alters the mortality in Madras very considerably, it scarcely makes any change in the Bengal and Bombay mortality, and the cholera biliosa has usually been about as fatal as the spasmodica. There is no question that these returns, if they are to be trusted, show a tendency to increased mortality.

III. *Mortality among European and Native Troops and Prisoners in Bengal.*

The per-centages up to 1854 are compiled from the large table in the Indian Annals; after that from the first Report of the Bengal Sanitary Commission; and the per-centages for prisoners are from Dr. Mouat's statistics of jails:—

Year.	European Troops.	Native Troops.	Year.	Prisoners.
1817-25 ...	28·5			
1826-30 ...	25·9	...		
1831-35 ...	25	...		
1836-40 ...	26·4	...	1839-43 ...	41·88
1841-45 ...	48	...	1844-48 ...	36·49
1846-50 ...	34·9	...	1852-56 ...	49·11
1851-53 ...	44·5	...		
1854-60 ...	51·9			

Since 1860 the mortality among troops in Bengal has been excessive, as appears from this table compiled from the Report, in which Dr. Bryden's most accurate returns are embodied:—

Year.	European Troops.	Native Troops.	Prisoners.
1862 ...	61·3	...	50·3 ... 36·4
1863 ...	75·1	...	57·0 ... 36·5
1864 ...	72·6	...	44 ... 36·6

This table shows that the increased mortality did not extend to jails.

The following table shows how the mortality varied in different parts of Bengal :—

Year.		Bengal Proper.		Dinapore and Oude.		Cawnpore and Meerut.		Agra and C. India.		Punjab.
1860	...	53·5	...	58	...	49·48	...	50	...	43·0
1861	...	48·	...	40	...	65·67	...	68·26	...	64·04

The mortality in different seasons in Bengal has varied much—

In 1830	it was	16.
„ 1839	„	16.
„ 1841	„	30.
„ 1842	„	50.
„ 1852	„	36.

The preceding tables are sufficient to show how mortality has varied in different places, and in different years, and among different classes. I must leave these data for others to interpret; but I cannot avoid the unpleasant conclusion that the mortality of cases treated among troops seems to have increased of late years. This is, I think, forced on us, although I do not consider the immense mortality assigned to the years 1863 and 1864 in reality of much importance, when I find that the per-centages of these years are procured from so small a number of cases as 373 for the two years.

This increased mortality is confined to troops. There is no increase of mortality among prisoners, none among patients treated in general hospitals. I never heard any one say the disease was more fatal in private practice, and I think the following fact is pretty conclusive on this head :—

In the decennial period of 1840 to 1850 there were 46,697 deaths by cholera in Calcutta; in 1850 to 1860 there were 45,823 deaths. Therefore in spite of the growing population of the place, and of no real improvement in drainage, there were 874 fewer deaths during the last

period. Though this does not refer to the number of cases treated, yet it affords a strong presumption that the disease cannot be getting more fatal.

I have looked in vain for some way of escaping the anomalous result, that our well-fed Europeans die in the largest, our Sepoys in the next largest, and our jail prisoners in the smallest proportion. The natural order of things would seem to be reversed. Should those who are best cared for suffer most?

What reasons can be assigned for this increased mortality of troops only?

1. Defective returns are blamed. Mr. Jameson remarked that our original returns did not show the full mortality, and as our diagnosis and classification became more perfect, many cases are returned as diarrhœa that would formerly have been set down as cholera. Commanding officers have been known to express a wish that cases should be returned as diarrhœa, if possible, and not as cholera. Still, making every allowance for defective returns, I do not think this affords an adequate explanation—that is, as far as I have been able to examine the question. The imperative necessity for laying down some very stringent rules as to classification for the future is obvious.

2. There does seem to have been a special malignity in some of the outbreaks: in the well-known case of Kurrachee, or in the year 1861, when of 725 admissions there were 450 deaths at Mean Meer; and of 210 admissions, 152 deaths at Morar. In all these instances bodies of troops were attacked in a proportion far exceeding that of the civil population. This special malignity, we must hope, is only temporary.

3. We are almost driven to suppose that there must have been something positive, predisposing men to these attacks. It is certain that there have been many more

Europeans in the country of late years, and therefore a tendency to crowding and massing. In some cases the effect of crowding and imperfect barracks was very obvious, in others less so. The same was the case according to the Cholera Report with respect to latrines, &c. This mortality, be it remembered, has taken place when the men were better fed and better cared for than in former times, or, at all events, when much more attention had been directed to subjects of hygiene than formerly. This mortality from one disease did not occur during or immediately after the mutiny; it was after men had settled down pretty well to quarters, and when the total annual mortality was small.

4. Treatment has been blamed, but has it been very different of late from what it used to be? And the mortality among prisoners in jails and in civil life should have increased, if treatment had been in fault. Besides, in all the varieties of treatment tried in every fresh epidemic, is there sufficient uniformity to give it a character that would affect the mortality of a severe epidemic? Europeans, I believe, suffered most in barracks; natives on the way to, or while engaged in frontier service.

Of late years, as insisted on by Dr. Morehead as a cause, troops have been made to go into tents, and certainly on the large scale we have no statistics to prove that this has been advantageous; but the mortality of troops began to increase before this precaution was adopted. The unpublished report of the Bengal Cholera Commission openly ascribed much of the mortality to mismanagement.

I am obliged to quit this, like other subjects, without being able to lay down anything very precise or positive, but the subject demands a thorough investigation.

THE END.

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